TISSUE WELDING

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MINIMIZING THERMAL INJURY TO VESSELS DURING LASER WELDING OF VASCULAR ANASTOMOSIS: A COMPARISON OF WAVELENGTHS AND THE USE OF ALBUMIN SOLDER

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Purpose: Thermal injury sustained by the vessel walls during a laser welded vascular anastomosis must be minimized to prevent thrombosis.

Methods: Fresh canine common carotids were subjected *ex vivo* to an amount of laser energy equivalent to that required to perform an anastomosis. Two factors were investigated (1) the 1.32 micron laser (1.32L, n=81) versus the 1.9 micron diode laser (1.9L, n=36) and, (2) the use of 35% human albumin solder (n= 54) versus laser alone (n=63). The vessels were immediately fixed, stained, and compared histologically to determine extent of necrosis sustained by the vessel.

Results: The 1.9L resulted in markedly reduced wall injury than the 1.32L, 18.5% of the wall thickness and 34.4% respectively ($p<.01$). Albumin solder was a factor in reducing acute injury in the 1.32L group, 37.3% compared with 28.5% without its use ($p<.01$). However, the solder's benefit was not significant in conjunction with the 1.9L, being 18.1% versus 19.4% ($p=.37$). An incidental hypereosiniphilic layer was observed between the necrotic and healthy tissue and thought to consist of injured cells that may later progress to cell death. This varied in thickness with the type of laser and was significantly less in the 1.9L vs. the 1.32L, 10.0% of the vessel wall thickness and 13.0% respectively ($p<.01$). Use of albumin reduced this layer in the 1.9L group from 13.3% without solder to 8.9% with solder ($p=.01$).

Conclusion: The 1.9 micron diode laser with albumin solder results in the least injury to the vessel wall. This may be significant in reducing thrombosis after laser welding of a vascular anastomosis.

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LASER-ASSISTED SKIN CLOSURE (LASC) USING A 815 NM DIODE-LASER SYSTEM ACCELERATES AND IMPROVES WOUND HEALING.

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This study aimed to evaluate a 815 nm diode-laser system to assist wound closure in order to accelerate and improve healing process.

Male hairless rats with four dorsal skin incisions were used for the study. For each wound, the good apposition of the edges was obtained with buried absorbable suture. The laser beam was applied spot by spot along two incisions with the following parameters: 1.5 W and 3 sec. Both control wounds were closed with conventional suture techniques. The duration of the closure procedure was noted for each group. Measurement of the skin surface temperature was processed in the laser group. Clinical examination, histological study with determination of Heat Shock Proteins (HSPs) and measurement of tensile strength were performed at 3, 7, 15 and 21 days after surgery. LASC was 4 times faster to process than conventional suture. The elevation of the surface skin temperature was about 48°C-50°C while applying laser. In the laser group, healing was accelerated resulting in a more indiscernible scar than in the control groups. Histological aspect was better with earlier continuous epidermis and dermis and a thinner resulting scar. Increase of HSPs was noted in the laser group. Tensile strength was 30 to 58 % greater than in control groups at 7 and 15 days ($p<0.001$).This study shows the ability of the 815 nm diode-laser system to assist wound closure leading to an acceleration and an improvement of wound healing with indiscernible resulting scar. The HSPs are stimulated by the elevation of temperature but their role in the acceleration of the wound healing process has to be clarified.

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NOVEL SOLID SOLDER GEOMETRIES AND DESIGNS FOR LASER-ASSISTED VASCULAR ANASTOMOSIS

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Encouraging results have been published using rectangular solid solder strips composed of indocyanine green (ICG) – doped albumin protein solders used in conjunction with an 808nm-diode laser. These investigations are furthered with this *in vitro* study conducted to assess a range of specially designed chromophore-enhanced solid protein solders manufactured and tested for application during laser-assisted anastomosis of bovine vascular specimens.

The study was divided into three parts. In the first part of the study, experiments were conducted to expand the use of the solid solder by tailoring the geometry's of the solder to specific clinically related geometry's including tubes, crescents and tape. In the second part of the study, the creation of a chromophore concentration gradient across the thickness of the solder was investigated as a means to allow control of the heat source gradient through the solder. Increased deposition of the laser energy near the vital solder/tissue interface was thus achieved. Finally, in the third part of the study, predenaturation of the solid solder was investigated as a means for increasing the flexibility and decreasing the brittle nature of the solid solder. The resulting solder was flexible enough to be wrapped around the tissue while its solid nature avoided the problems associated with "runaway" of the less viscous liquid solders currently used by researchers. In addition, predenaturing the solder enhanced its stability in a hydrated environment thus improving the handling characteristics of the solder for clinical application.

The application of ICG-doped albumin protein solders to augment laser tissue repairs is shown to enhance edge co-optation, improve repair strength and to reduce thermal tissue injury. The moldable, absorption controllable and flexible nature of the novel solid protein solders presented greatly improves the clinical applicability of laser tissue solder repair.

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Double Layer Film as a Laser Soldering Device

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Purpose: A *two-layer* solder was developed to weld at low laser fluence and to provide a new method of measuring the solder-tissue temperature. **Methods:** A film solder consisted of a white layer [75% Bovine Serum Albumin (BSA) 25% distilled water] and a black layer [75% BSA, 0.25% Carbon Black (CB) and 24.75% distilled water]. This *two-layer* solder (~5x0.8x0.15 mm)

was used with a diode laser to weld 15 sections of dog small intestine (λ=810 nm, power = 200±10 mW, radiation time = 65±5 s, fiber core–400 μm). The black layer of the solder was positioned onto the tissue to absorb the laser beam and efficiently transmit the generated heat to the tissue-solder interface. A control group consisted of 15 sections of intestine, which were welded only with a *one-layer* black solder. The welds were tested for tensile strength. The external solder temperature and the solder-tissue interface temperature were simultaneously measured for 30 seconds during welding, with K-type thermocouples. **Results:** There was no significant difference between the breaking force of the two welding groups (0.10±0.03 N vs 0.12±0.02 N, $p>0.05$). The temperature difference between the external surface of the solder and the solder-tissue interface was significantly less for the *two-layer* solder than for the *one-layer* solder (4±4 °C and 23±10 °C, respectively; $p<0.05$). **Conclusion:** The *two-layer* and *one-layer* solder welds had similar strength. The laser path increased by half solder thickness (white layer) prior to the CB absorption, demonstrating less laser fluence for the *two-layer* solder. Furthermore, the "quasi symmetric" heat diffusion from the black mid-plane of the *two-layer* solder decreased the difference in temperature recorded on the solder external surface and on the solder-tissue interface.

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Assessment of the Degradation of Denatured Albumin Solder by Human Urine. Bernardo Cuomo, Antonio Lauto, Irena Kirman, Diane Felsen and Dix Poppas. *The Laboratory of Minimally Invasive Surgery, Department of Urology, New York Presbyterian Hospital-Weill Medical College of Cornell University, New York, NY.*

Several studies have been undertaken to evaluate the efficacy of human serum albumin (HSA) as a solder in urologic procedures. The purpose of this study was to evaluate whether albumin solder undergoes significant degradation in urine. Methods: Laser denatured 25% HSA pellets were incubated at 37° C for varying times with 1 ml of either pooled urine or control diluent solution adjusted to the same pH and osmolality as urine. To assess the contribution of enzymatic degradation, aliquots of urine were boiled and compared to non-treated urine and boiled diluent. The amount of solubilized HSA in solution was measured using the Bradford assay, while the degradation of albumin was detected by SDS-PAGE. Results: Less than 5% of the albumin was degraded over a period of 7 days following any treatment (Table 1). SDS-PAGE revealed only minor traces of degradation in urine and controls. The very slight degradation of denatured HSA is non-enzymatic, as it was observed in both urine and diluent samples. Conclusions: HSA solder appears to be safe for use in urologic reconstructive surgery since it is not appreciably degraded in the presence of urine.

Table 1:Percent of albumin degraded by incubation with urine and diluent

	Day 1	Day 3	Day 7
Urine	3.63 % ± 0.4	4.33 % ± 0.30	5.03 % ± 0.41 ♠
Boiled Urine	4.33 % ± 0.92	5.13 % ± 1.68	4.16 % ± 1.48
Urine Diluent	4.63 % ± 2.46	3.9 % ± 0.45	1.73 % ± 0.68 ♠
Boiled Diluent	2.10 % ± 1.15	3.90 % ± 2.83	3.73 % ± 2.45

♠$p< 0.05$ Day 7 urine compare to Day 7 diluent

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LASER TISSUE SOLDERING FOR HYPOSPADIAS REPAIR: RESULTS OF A PROSPECTIVE CLINICAL TRIAL. Andrew J. Kirsch, Christopher S. Cooper, Douglas A. Canning, Stephen A. Zderic, Howard M. Snyder, Hal C. Scherz. *Children's Hospital of Philadelphia, PA and Scottish Rite/Egleston's Children's Hospitals, Atlanta, GA*

Purpose: Laser tissue soldering (LTS) is a safe and effective method of tissue closure resulting in minimal scar formation. The purpose of this study was to compare the results of LTS to conventional suturing for hyposadias repair.

Methods: A consecutive group of 70 boys, ages 4 mo to 8 yrs (mean 15 mo.) were divided between standard suturing (N=44) or "sutureless" laser hypospadias repair (N=26). Urethral repairs were defined as simple (Thiersch-Duplay or Snodgrass, N=42) or complex (onlay island flap or tube, N=28). LTS was performed with a 50% human albumin solder doped with ICG dye using an 808 nm diode laser (P=0.5W). In the laser group, sutures were used for tissue alignment only. At surgery, neourethral and penile lengths, operative time for neourethral construction, and number of sutures or throws were measured. Postoperatively, patients were examined for complications of wound healing, stricture or fistula formation.

Results: Mean age, severity of urethral defect, type of repair, neourethral length, and stent time were not significantly different between the two groups. Operative time was over five times faster for LTS in both simple (1.5 ± 0.1 min, $p<0.001$) and complex (5.1 ± 0.3 min, $p< 0.001$) repairs vs. controls (8.5 ± 0.8 min and 26.7 ± 1.7 min, respectively). The mean number of sutures for tissue alignment in the laser group for simple and complex repair (3.0 ± 0.2 and 8.2 ± 0.6, respectively) was significantly ($p<0.001$) less than control groups (8.5 ± 0.8 and 23.2 ± 1.5, respectively). Followup ranged from 5-22 months (mean 12 mo). The complication rate was 7.7% (2/26) in the laser group (2 fistulas) and 13.6% (6/44) in the controls (4 fistulas, 2 meatal stenoses).

Conclusions: These results indicate that laser hypospadias repair may be performed in a nearly sutureless fashion and more rapidly than suturing. The ease of the laser technique and the lower complication rate in the laser group at this time indicates that LTS deserves further study.

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NON THERMAL URETERAL TISSUE BONDING: COMPARISON OF PHOTOCHEMICAL COLLAGEN CROSSLINKING WITH THERMAL LASER BONDING.

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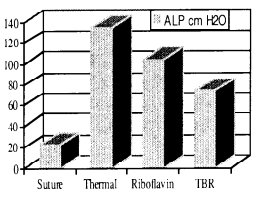
Background: Because of difficulties with suture placement during minimally invasive procedures, alternative methods are being sought including photochemical welding. We have previously reported on the use of TBR with inferior results to thermal welding. We currently report our ex-vivo experience with an alternate agent, riboflavin-5-phosphate Methods: Rabbit ureteral segments were harvested. End-to-end anastomoses were created using several methods: 1) *Photochemical bonding:* The photoalkylating agents used were TBR combined with collagen (n=15) or riboflavin combined with fibrinogen (n=12). 2) *Thermal laser bonding*: (n=12). 3) *Sutured anastomoses*.. Bond strength was evaluated by measuring the anastomotic leak pressure.



Results: Thermal and photochemical bonding with TBR (74±50 cmH_2O) and riboflavin (103±38cmH_2O) were significantly stronger than sutured repairs. The strength of riboflavin bonding approximated

that of thermal bonding. Conclusion: Photochemical bonding can achieve similar bond strength to thermal welding without the risk of damage to surrounding tissues and should be further evaluated for minimally invasive urological anastomoses.

UROLOGY

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PHOTOCHEMICAL ABLATION OF INTESTINAL MUCOSA FOLLOWING ENTEROCYSTOPLASTY USING INTRAVESICAL 5-AMINOLEVULINIC ACID IN A RAT MODEL.

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PURPOSE: In this investigation, we studied the biodistribution of intravenous and intravesically administered 5-Aminolevulinic acid (ALA) induced protoporphyrin IX (PpIX) following enterocystoplasty in a rat model using extraction spectroscopy. After determining the optimal intestinal augment / bladder ratio of PpIX, photochemical ablation of the intestinal mucosa was attempted using a transurethral approach.

METHODS: Enterocystoplasty was performed in 40 female Fischer 344 rats using terminal ileum. Of the 40 rats, 33 survived at least 2 weeks before extraction spectroscopy was performed. Tissue PpIX levels were determined after intravenous or intravesical instillation of 10% ALA (pH 5.5). Intravesical dwell times of 1, 2, and 3 hours were used with chemical extraction at 0, 1, 2, and 3 hours after bladder emptying. Chemical extraction was performed 1 and 2 hours following intravenous injection of ALA. Tissue levels of PpIX in the bladder were compared with the intestinal augment. Optimal tissue levels of PpIX with an intestinal augment/bladder ratio of 2.5:1 were seen in the intravesical group with a dwell time of 1 hour, with chemical extraction 2 hours following bladder emptying. These parameters were used to perform photochemical ablation of the intestinal mucosa with a Helium neon laser (632 nm, 50 J) using a transurethral approach. 1% intralipid was used as a light diffusing medium. Animals were sacrificed 48 hours, 96 hours, and 6 weeks after photodynamic therapy (PDT). Histological studies were performed in 24 rats.

RESULTS: Intravesical ALA instillation yielded higher levels of PpIX with a more selective intestinal mucosa uptake than intravenous injection. A drug dwell time of 1 hour with chemical extraction 2 hours following bladder drainage yielded the highest augment/bladder PpIX ratio (2.5:1). Histological studies performed 48 hours after PDT revealed loss of intestinal mucosa, preservation of the intestinal submucosa, muscularis, and serosa with no damage to the bladder mucosa and submucosa. The histology at 96 hours revealed complete overgrowth of the intestinal augment with urothelium. Mucin producing cells were absent. This finding was confirmed at 6 weeks with no evidence of excessive collagen deposition.

CONCLUSIONS: Intravesical instillation of ALA allows for preferential conversion of ALA to PpIX in the intestinal mucosa as compared to the bladder. This approach can be used to perform selective photochemical ablation of intestinal mucosa after enterocystoplasty with subsequent urothelialization of the augment in a rat model.

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PHOTODYNAMIC THERAPY(PDT) OF THE RABBIT BOWEL AND BLADDER AFTER INSTILLATION AND INJECTION OF AMINOLEVULINIC ACID(ALA) : UPTAKE OF PROTOPORPHYRIN IX (PPIX) AND DEPTH OF NECROSIS. Paul A. Merguerian MD, Jeff Pugach, MD, Jane Park, Marja Sepers and Lothar Lilge PhD. Division of Urology, Hospital for Sick Children, and Photonics Research Ontario, University of Toronto, Toronto, Canada.

Introduction: A possible method of preventing the complications of enterocystoplasty may be by ablating the bowel endothelium using PDT and seeding the denuded segment with bladder urothelium. Our study was designed to evaluate the absorption and necrosis of PDT using ALA. **Methods:** In 12 New Zealand rabbits a vascularized segment of small bowel was isolated. Group A received 100mg/kg ALA injected intravenously and group B had 140mg of ALA instilled into the small bowel and bladder. After 3 hours uptake of PPIX in the mucosa and submucosa of the bladder and bowel was determined by extraction of PPIX, fluorescence spectroscopy and confocal microscopy. Both the bowel and bladder were irradiated at 5,10,20,25 and 50 Joules/cm^2. 24 hours after irradiation the rabbits were sacrificed and both the bladder and bowel evaluated. **Results:** *Intravenous injection:* we found no difference in the uptake of PPIX in the mucosa and submucosa of either the bladder or the colon. *ALA instillation*: A more reproducible ablation of the bladder and bowel mucosa only was achieved by ALA instillation. Bowel and bladder mucosa were found to be equally sensitive. At above 25 Joules /cm2 the submucosa was also affected with damage to muscle strands. **Conclusion:** Instillation of ALA seems to be preferentially absorbed by the bladder and bowel mucosa and can therefore be used to selectively cause necrosis of the mucosa alone. This modality, though cannot be used to selectively ablate the bowel mucosa in patients who have already undergone enterocystoplasty.

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PHOTODYNAMIC THERAPY IN BLADDER CANCER

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INTRODUCTION AND PURPOSE: After 15 years of laboratory and clinical investigations Photodynamic therapy (PDT) still remains an investigational intravesical therapy for resistant superficial bladder cancer. The few published series often contain very few patients with unknown history of disease characteristics and prior intravesical treatments. We reviewed these phase I/II studies in order to assess the current status of PDT in the management of resistant bladder cancer.

MATERIALS AND METHOD: We reviewed reports of clinical investigations published in the English literature in the last 15 years and assessed primarily the data on safety and efficacy.

RESULTS: One hundred fourteen patients with refractory CIS have been treated with Photofrin® PDT. However, only 36/114 patients were enrolled in a multicenter study using a uniform protocol; the other 78 patients were treated under various protocols at eight medical centers in North America and Europe. Initial assessment at 3 months revealed that complete responses occurred in 91/114 (80%) of patients. Within a mean follow-up of 36 (range 3-55) months 37/114 (32.5%) of patients experienced recurrences. Bladder contracture (i.e. 50% or greater reduction in bladder capacity) occurred in 15/114 (13.2%) of the patients. Two of eight studies specifically evaluated local vesical toxicity as a function of PDT dose (drug and light). In their 72 patients who were treated with Photofrin® dose of 1.5 mg/kg or 2 mg/kg and light (630 nm) dose (total Joules) of 1500 to 7000 Joules, bladder contracture occurred in none of the patients treated with 2500 Joules or less. However, bladder contracture occurred in 14/36 (39%) of patients treated with total light dose of greater than 3000 Joules.

CONCLUSION: PDT is an effective therapy for refractory CIS with a long term bladder preservation in 47% of patients at 3 years. Importantly, WBPDT with 1.5 mg/kg of Photofrin® and 2500 Joules or less does not result in bladder contracture. However, protocol using sequential PDT treatments may result in durable tumor responses.

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USING INTERSTITIAL LASER COAGULATION TO TREAT BPH: THE EFFECT OF PREDNISONE ON POST-OPERATIVE DYSURIA AND ON OUTCOME AT TWELVE MONTHS.

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(Presented by Dr. Williams)

INTRODUCTION: Interstitial Laser Coagulation of the Prostate (ILC) is a promising minimally invasive procedure performed to relieve symptomatic benign prostatic hyperplasia (BPH) and is accomplished by directing laser energy into the gland via an implanted optical fiber. 12 to 25% of patients will complain of significant post-operative dysuria. The purposes of this study were: 1) to determine if steroid anti-inflammatory drugs after ILC would decrease dysuria; 2) to determine if operative outcome at 12 months is affected by steroid use perioperatively.

MATERIALS AND METHODS: From February 1997 to May 1997, 25 men underwent ILC of the Prostate for symptomatic BPH. Preoperative data included AUA symptom index score, maximum urinary flow rate (Qmax), post void residual. ILC via the Indigo 830e and standard cystoscopic equipment was performed in an outpatient surgical setting with monitored anesthesia care. Post-operatively all patients received oral antibiotics, pyridium and an indwelling Foley catheter. Patients were also placed on a prednisone taper (40 mgs X 2 days, 30 mgs X 2 days, 20 mgs X 2 days, then 10 mgs X 3 days) immediately after surgery. Catheters were removed on POD #2.

RESULTS: ILC patients had a pretreatment average ASIS of 21, Qmax of 9 cc/sec, and PVR of 70 cc's. Six months after treatment the patients had an average ASIS of 9 , Qmax of 17 cc/s, and PVR of 68 cc's . Twelve months after treatment the patients had an average ASIS of 8, Qmax of 16 cc/s, and PVR of 60 cc's. Significant dysuria was reported by 1 patient postoperatively. 2 patients required recatheterization for retention. One patient developed mild pancreatitis postoperatively.

CONCLUSIONS: Patient complaints of dysuria and Foley catheter duration is decreased in those taking oral steroid anti-inflammatory medications post-operatively. Prednisone use in the early post-operative period does not have a negative impact on the objective results of ILC at 6 and 12 months. The results are similar to the authors previously reported 12 month outcomes after ILC.

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EXPERIENCE WITH ENDOSCOPIC HOLMIUM LASER IN CHILDREN. Paul Merguerian MD, , Pramod P. Reddy MD, Diego Barrieras MD, Darius Bägli MD, Gordon A. McLorie MD, Antoine E. Khoury MD. Division of Urology, Hospital for Sick Children, University of Toronto, Toronto, Ontario, Canada.

Introduction: Children have not benefited fully from the technological advances in endourology. This limitation is overcome with the Holmium:Yttrium-Aluminum-Garnet (Ho:YAG) laser delivered via small instruments. Purpose: We evaluated our experience with the Ho:YAG laser in the treatment of pediatric urolithiasis, posterior urethral valves, ureterocele, ureteropelvic junction obstruction and urethral strictures. Methods: The patient population included 10 children with urolithiasis, 2 children with posterior urethral valves, 2 children with obstructing ureteroceles, 2 children with ureteropelvic junction obstruction and 1 child with a urethral stricture. Accesses to the lesions were either antegrade or retrograde. A solid state Ho:YAG laser (New Star Lasers, Auburn, CA) was utilized as the energy source. Results: 10 patients underwent laser lithotripsy with a mean age of 9 yrs (5-13 yrs). 8 required one procedure to render them stone free , two patients had staghorn calculi requiring more than one treatment. There were no complications. Two newborns underwent ablation of posterior urethral valves. Two infants underwent incision of obstructing ureteroceles. Two children underwent endopyelotomy for ureteropelvic junction obstruction. One child underwent a direct visual urethrotomy for a urethral stricture. Conclusions: Our experience indicates an advantage of the Ho:YAG in lithotripsy and endopyelotomy. These include the ability to apply the laser using small fibers with minimal trauma to surrounding tissue and pulverize calculi. We do not feel the Ho:YAG laser is superior to the current treatment methods for posterior urethral valves and obstructed ureteroceles.

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Sutureless end to end ureteral and heterograft anastomosis using photothermal sensitive hydrolyzable intraluminal stent and diode laser

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Objectives: We report our experience with the creation of a photothermal sensitive hydrolyzable (PSH) stent for end to end ureteral anastomosis using sutureless laser welding in vitro.

Methods: Fresh porcine ureter segments underwent end to end anastomosis for ureter (n=12), ureteral and heterograft (n=12) using diode laser welding. The heterograft were prepared by our biomaterial group. The PSH stent was used to stand and connect the ureteral stumps. The anastomotic seam was lasered with 804 nm diode laser which energy was delivered through a 600 micron non touch optical fiber. And, a 1 watt cw mode was applied for range from 63 to 107 seconds in the welding process. Tensile strength and burst pressure were measured after rehydration overnight in 37 c degree saline.

Results: Tensile strength and burst pressure ranged from 225.2-602.8 g/cm2 and over 200 mmHg in the ureteral welding, and from 148.8-448.1 g/cm2 and 183-over 200 mmHg in ureter by heterograft welding.

Conclusions: A water tight anastomosis were achieved by laser welding using the PSH stent. The stent plays double roles as solder and stand in the ureteral and vessel anastomosis using laser welding.

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A photothermal sensitive hydrolyzable stent for ureteral sutureless anastomosis using diode laser in vivo

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Prior studies demonstrated that tensile strength of laser tissue soldering was depend on the concentration of solder. A photothermal sensitive hydrolyzable(PSH) stent designed for tubular tissue anastomosis using diode laser welding were applied in our studies.

Five swine underwent bilateral segmental replacement of 3 cm of mid-ureter using a elastin base heterograft which prepared by our biomaterial group. The PSH stent which is composed of solid human serum albumen containing 0.1 mM ICG was used to stand and connect the ureteral and heterograft stumps at one side. At opposite side ureter, the ureter and heterograft were welded using a liquid solder (54% albumin with 0.1mM ICG) as comparisons. The anastomotic seam was irradiated with 804 nm diode laser which energy was delivered through a 600 micron non contact optic fiber. 1 watt CW mode and 1-2 mm diameter. irradiated spot on tissue was applied during welding. Retrograde urograph were performed after a hour postoparetively. Then, animal were sacrificed and ureters were harvested for tensile strength and histology studies.

Radiology study demonstrated that the PSH stent were dissolved at 1 hour post surgery. No leakage using PSH stent(10/10) and a 30% leakage(3/10) using liquid solder were observed at anastomosis site. The mean tensile strength of PSH stent and liquid solder welding was 548.4 g/cm2 and 521.6 g/cm2. However, The irradiation time using PSH stent (67.1 +26.5 sec.) was significantly shorter than the time using liquid solder(121.3 + 38.2 sec.), respectively. Histology study showed a wilder and deeper thermal injure on the ureter tissues which welded using liquid solder. The rest of PSH stent bound and stood on the anastomotic site.

Our results show that the PSH stent play as solder and supporter roles for decreasing irradiation time and thermal damage and providing a convenient method in ureteral anastomosis using laser welding.

VETERINARY MEDICINE

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PHOTOTHERMAL LASER ABLATION OF FELINE NASAL SQUAMOUS CELL CARCINOMA

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Squamous cell carcinomas are malignant neoplasms arising from squamous epithelial cells and are commonly found on small animals. The cause of the neoplasm is unclear although there is some correlation between development of squamous cell carcinoma and exposure to ultraviolet light (sunlight). Squamous cell carcinomas are usually solitary lesions, and in the cat, the most common sites are the tips of the ears, nose, and eyelids. Prognosis has depended on the degree of histopathologic differentiation, but not on anatomic sites. Treatment of feline squamous cell carcinoma has included surgical excision, electrosurgery, cryosurgery, hyperthermia, radiotherapy, chemotherapy, photodynamic therapy, and laser ablation. Photothermal laser ablation has been used to vaporize active lesions on the nasal planum and face of 13 cats. A number of laser wavelengths including 532, 810, 1064, and 10,600 nm have been utilized with moderate success as far as palliation of the active lesion. Animals have responded well as far as post-surgical morbidity for up to 24 months although the procedure is definitely not curative. A combination of photothermal laser ablation as a debulking procedure to reduce tumor mass coupled with photodynamic therapy using Foscan® / mTHPC within 6 weeks of surgery is suggested as a more rational approach for treatment of this condition in the cat.

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CO_2 LASER EXCISION OF LINGUAL MASSES IN DOGS AND CATS. Thomas R. Fry, Louisville, KY. Kenneth E. Bartels, Oklahoma State University

A 12 watt (w) CO_2 laser was utilized for excision or ablation of various lingual pathologies in 3 dogs and 2 cats. Masses were ablated using a variety of tips with continuous wave settings from 7 w to 12 w. Case 1 was a 5 year old domestic shorthair where a chronically infected mass of exhuberant granulation tissue along the lateral sublingual margin was ablated. The excisional bed was sterilized following excision. Power settings were at 12 w with a 0.8 mm tip. Six months postoperatively, no pathology is evident. Case 2 was a 5 year old female cat with a dorsal lingual mastocytoma. Tumor was ablated using a 0.8 mm tip on 7 w setting. Two years later the cat is alive with recurrent tumor. Case 3 was a 9 month old mixed breed dog with sublingual calcinosis circumscripta. Nine watt settings with a 0.25 mm tip were used to excise the mass. Recovery was complete and at 1 year postoperatively the dog is normal. Case 4 was an 11 year old male chow chow with dorsal lingual melanoma. Nine watt settings with an 0.8 mm tip were used to excise the mass and ablate the tumor bed. At 4 months postoperatively, 2 recurrent melanomas were excised at the same site using similar methods. Six months following the second excision, the dog is tumor free. Case 5 was a nine year old female mixed breed dog with lingual hemangiosarcoma and pulmonary metastasis. The laser was used to debulk the lingual lesion using 0.25 mm and 1.3 mm tips on 10 w settings. Chemotherapy was initiated (vincristine, adriamycin, cytoxan) and the dog succumbed to brain metastasis 4 months later. No primary regrowth was noted at that time. In all cases there were no complications attributed to laser use. All patients returned to normal food and water consumption by the following day. No dehiscence, delayed healing, wound infections, or tongue sloughs were noted. The CO_2 laser appears promising as an excisional and ablative tool for lingual masses of both dogs and cats.

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LASER-INDUCED SHOCK WAVE LITHOTRIPSY OF CANINE UROLITHS

J. Paul Woods, Kenneth E. Bartels, Ellen B. Davidson, Christopher S. Arnold, E.L. Stair, College of Veterinary Medicine, Steven A. Schafer, Department of Physics, Oklahoma State University, Stillwater, OK;
Robert E. Nordquist, Wound Healing of Oklahoma, Oklahoma City, OK.

Canine uroliths that cannot be successfully managed with dietary and medical protocols are treated surgically. Surgical management may result in significant morbidity and risk. The purpose of this study was to investigate an innovative technique to noninvasively fragment uroliths utilizing laser light transmitted endoscopically through optic fibers resulting in less tissue trauma, morbidity (side effects) and pain. A flashlamp-pumped pulsed Cr:Tm:Ho:YAG laser (2100 nm λ) was used to fragment canine uroliths of varying size and composition in order to determine the required set of laser operating parameters. These energy parameters were employed on freshly euthanatized canine cadaveric tissues to determine appropriate fluences and laser-to-tissue distances that could be tolerated without causing unacceptable trauma. Surgically placed uroliths were then fragmented using the Ho:YAG laser under endoscopic visualization. The morbidity of the laser lithotripsy was assessed with respect to tissue damage.

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USE OF A 980 NM DIODE LASER FOR TRANSENDOSCOPIC UPPER RESPIRATORY TRACT SURGERY IN THE HORSE. Eric Tulleners. University of Pennsylvania, Kennett Square, PA

Purpose: The purpose of this study is to describe the usefulness of the 980 nanometer (nm) diode laser for performing transendoscopic surgery in the upper respiratory tract of the horse.

Methods: Space-occupying lesions and dynamic collapse of tissue in the pharynx and larynx is common in horses used for athletic purposes. Transendoscopic laser correction of these problems provides a minimally invasive approach, which eliminates the need for general inhalation anesthesia and the potential risks and morbidity associated with conventional open surgical approaches. The diode laser's 980 nm wavelength corresponds to a peak of water absorption which is approximately 3 times greater than that of the Nd:YAG laser. Using a flexible videoendoscope, transendoscopic light delivery to tissue is best accomplished using either a 600 or 800 micron outer diameter fiber. When used in contact fashion, the 980 nm diode laser is an excellent energy source for precise incision and excision of soft tissue structures. For most procedures, hemorrhage is negligible. The immediate, grossly visible lateral thermal effect is also minimal.

Outpatient surgery can be quickly, efficiently, and safely performed on the standing horse using moderate levels of sedation and topical anesthesia. The 980 nm diode laser is portable (14 kg), internally cooled, and operates off standard 110-volt outlets. Stall side or field ambulatory surgery can be performed in the absence of electricity by providing power to the laser from a converter which attaches to any car battery.

Results and Conclusions: Examples of procedures which can be performed transendoscopically include correction of epiglottic entrapment by the aryepiglottic folds, excision of subepiglottic or dorsal pharyngeal cysts, correction of axial deviation of the aryepiglottic folds, ventriculofoldectomy, excision of intralaryngeal or intratracheal granulation tissue, correction of guttural pouch tympany, and correction of choanal atresia. By connecting the fiber to a pencil grip handpiece, conventional surgery, such as palmar digital neurectomy, excision of sarcoids or squamous cell carcinoma, or wound debridement, can also be performed.

MINI-TALK SUMMARIES

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THE INFLUENCE OF THE ANAGEN:TELOGEN RATIO ON THE LASER HAIR REMOVAL EFFICACY

Vladimir Kolinko [1], Curt M. Littler [2],
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[2]*Scripps Clinic and Research Foundation, La Jolla, CA*

The purpose of this study was to determine the influence of the anagen:telogen ratio on laser hair removal results. Though it has been empirically observed that only anagen hair are responsive to laser hair removal, this has not been shown experimentally in humans. Furthermore, if anagen hairs are most responsive , preoperative knowledge of the anagen:telogen ratio should be at least somewhat predictive of treatment effectiveness.
Several test areas with excess hair in a single body region were marked in human volunteers. The hair number was first determined using photographs and microscopic counts. Following this preliminary evaluation, hair was trimmed to approximately 2 mm. Two weeks later, photographic and microscopic analysis was repeated. Actively growing anagen hairs were at least twice as long as those in telogen at the two week visit. The anagen:telogen ratio was determined from these hair counts prior to treatment. Lasing was then done with topical carbon suspension and Q-switched Nd:YAG laser at 2.5 J/cm2, 7 mm spot and 10 Hz in all test areas. Subsequent photographs were taken at set intervals thereafter. Results demonstrate that areas with higher anagen:telogen ratios had greater hair reduction than those with low ratios. This further confirms the observation that anagen hairs are most responsive to laser hair removal. In addition, preoperative determination of the percentage of anagen hairs in a treatment site may serve as a potential predictor of laser hair removal results in a given individual and body site.

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INTENSE PULSED LIGHT FOR HAIR REMOVAL: RESULTS AT 1.5 YEARS

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Multiple laser and light source devices are presently being utilized for hair removal. Long-term efficacy is being questioned. We present data obtained at one and a half years following use of intense pulsed light for hair removal.

Twenty-five 25 patients who received 4 treatments of intense pulsed light over a period of one year on various body locations (back, inguinal, face, legs) were followed. Fitzpatrick type skin types from I – V were treated. Hair counts were obtained by averaging counts in 3 regions of 1 cm2 obtained by placing a template over the treated area. Hair counts were obtained prior to each treatment at 0, 3, 6, 9 and 12 months and at 6 months after the last treatment. Patients were typically treated to the end point of erythema, peri-follicular urtication and hairs burnt to the skin surface.
Hair counts demonstrated a reduction of hairs of 45% at 3 months, 52% at 6 months, 43% at 9 months and 63% at 12 months. Hair counts at 6 months after the last treatment were a mean of 59% less (+/- 22%) than prior to beginning treatment. Side effects included a low incidence of pigmentation changes, crusting and vesiculation. Intense pulsed light is safe and effective for long-term hair removal. Reduction of hair count is maintained following cessation of treatment.

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EVALUATION OF PULSED, INFRARED LASER SYSTEM FOR LONG-TERM HAIR REMOVAL

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This study was designed to evaluate the long term efficacy of pulsed, infrared laser system (800nm diode, 5-30msec, 10-40J/cm^2, 9x9mm, cooling handpiece) for hair removal at one year post-treatment.

Fifty subjects with skin type I-IV underwent treatment after determining the highest tolerated fluence (15-40J/cm^2). Treatment sites included the face, trunk, and extremities. Each subject received up to three treatments per site. One year and 1.5 year after completion of treatment, the subjects were evaluated by hair counts or hair thickness.

Follow-up data showed prolonged hair reduction at 1 and 1.5 year in many of the subjects. No side effects such as pigmentary changes persisted.

The pulsed infrared laser system can achieve persistent hair reduction up to 1 and 1.5 year in some subjects.

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The Efficacy Of A Long Pulse 755nm Alexandrite Laser On Hair Bearing Flaps And Grafts

V. Narurkar MD, C. Tolan MD and J. Sykes MD. UC Davis Laser Center and Bay Area Laser Institute, Sacramento, CA and San Francisco, CA

Evaluation of a 755nm long pulse Alexandrite laser for hair reduction on flaps and grafts was examined in 25 patients undergoing reconstruction of facial defects. The purpose of this study was to examine the long term efficacy on hair reduction in flaps and grafts from hair bearing areas utilized in head and neck reconstruction.

25 patients with flaps and grafts from hair bearing skin were treated with a 755nm long pulse Alexandrite laser at 20msec and fluences of 20-30j/cm2. Hair reduction after single and multiple treatments was documented by hair counts, photography and patient reports.

Hair bearing flaps and grafts from high anagen content areas (e..g. scalp) with dark and coarse hair showed the greatest degree of hair reduction. Multiple treatments were required for long term hair reduction. Percentage of hair reduction was dependent on anatomic site, color and density/diameter of hairs.

Head and neck reconstruction of large surgical defects often requires the use of hair bearing flaps and grafts and their transfer to non-hair bearing skin. We conclude the 755nm long pulse Alexandrite laser is safe and effective in hair reduction on hair bearing flaps and grafts utilized in facial reconstruction

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ALEXANDRITE LASER HAIR REMOVAL:COMPARISON OF TWO DIFFERENT PULSE DURATIONS. David J. Goldberg, New Jersey Medical School and Skin Laser Center, Pascack Valley Hospital, Westwood, New Jersey.

The alexandrite laser has been shown to be effective in the removal of unwanted hair. Currently available systems vary in their emitted pulse durations. This study was designed to compare the efficacy of a 2 msec and a 10 msec pulse duration alexandrite laser.

6 subjects received 3 sessions of alexandrite laser hair removal. Each subject received treatment with a 2 msec system on one side and a 10 msec system on the contralateral side. Evaluations were made during treatment and for six months after the final treatment. Clinical efficacy was seen with both a 2 msec and a 10 msec alexandrite laser.

Alexandrite lasers with a variety of different pulse durations may be effective in the removal of unwanted hair.

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SUCCESSFUL TREATMENT OF PSEUDO-FOLLICULITIS BARBAE WITH LONG-PULSED ALEXANDRITE LASER IRRADIATION

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PURPOSE: To decrease the papules, pustules, hyperpigmentation and subjective symptoms associated with pseudo-folliculitis barbae (PFB) using long-pulsed 755 nm alexandrite laser irradiation.
METHODS: 10 patients with pseudo-folliculitis barbae and skin phototypes IV or greater were treated with a 755 nm alexandrite laser. A pulse duration of 20 msec and energy fluences from 5-8 J/cm^2 were used at 4 week intervals for a total of six treatments. A cooled, water-soluble gel was applied to the skin surface prior to treatment and a 12.5 mm spotsize was used to deliver non-overlapping laser pulses. Both subjective and objective assessments, including photographic analyses and patient diaries were used to evaluate treatment outcome. Subjects were followed-up for four months.
RESULTS: All subjects achieved at least a 50% reduction in lesion count and subjective symptoms. One quarter of those treated had a 75% or greater reduction in the signs and symptoms of PFB. Papules, pustules, and dyspigmentation were all successfully decreased. Treatment discomfort, transient hyperpigmentation, and crusting occurred rarely: however, no long-term side-effects occurred. Hair regrowth after laser treatment was delayed but not permanently removed.
CONCLUSIONS: Long-pulsed alexandrite laser irradiation of facial skin decreases the signs and symptoms of pseudo-folliculitis barbae after 6 treatments. Hair growth is delayed but not permanently removed at the low-energy fluences used to treat darker skin types The effects of laser treatment persist for at least 4 months.

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TREATMENT OF DERMATOFIBROMAS WITH THE PULSE DYE LASER

Vera Chotzen, Suzanne L. Kilmer, Jacqueline Calkin, Susan Silva and Marla McClaren. Laser & Skin Surgery Center of Northern California, Sacramento, CA.

Dermatofibroma treatment options include liquid nitrogen with minimal improvement or excision leaving a linear scar. Though these lesions vary clinically in that they can be hyperpigmented, erythematous, or skin colored, histologically they have scar-like features with increased blood vessels. Pulse dye laser (PDL) can improve vascular lesions and scars, therefore, we hypothesized that these lesions may be improved by pulse dye laser. In this study, 50 lesions clinically consistent with DF were treated with the PDL (Candela Corporation Model SPTL 1B) with the 10 mm spot size/5J/cm2 with one to three pulses per lesion depending on the response to treatment. Treatment endpoint was achieved when a moderate amount of purpura was obtained. Lesions were reassessed at four to six week intervals by the patient and physician and, if there was any raised component remaining, a second treatment was undergone. After two treatments, results were remarkable for 90% improvement in flattening and overall patient opinion of lesion cosmetic acceptability. Side effects included transient hyperpigmentation in 20% of patients associated with skin type III-IV. No hypopigmentation was noted. In four patients with multiple DF's, one lesion was treated with liquid nitrogen for comparison to PDL and results showed more clinically significant improvement in the PDL treated lesions. Histologically patients had fewer number of vessels and more normal appearing collagen.

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PULSED DYE LASER AND INTRALESIONAL BLEOMYCIN FOR TREATMENT OF RESISTANT VIRAL WARTS. B Pollock , R Sheehan-Dare. Department of Dermatology, Leeds General Infirmary, Leeds, England.

Viral warts which resist conventional treatments are a frequent problem in Dermatology. Despite an array of treatments, none have emerged as treatment of choice for therapy resistant warts. Surgical removal by curettage and carbon dioxide laser ablation is associated with high post-treatment morbidity and inconvenient wound care. Intralesional bleomycin can be effective, but administration is often difficult. Successes with pulsed dye laser are variable. We have undertaken an open study of two tried and tested methods and combined them in a simple to administer technique, to effectively treat viral warts resistant to a range of other treatments including topical therapy, cryotherapy, high dose cimetidine, carbon dioxide laser, and pulsed dye laser alone.

Seven adult subjects all with resistant hand warts of at least 3 years duration were enrolled into an open pilot study. Informed consent was obtained and warts traced and photographed. The area to be treated was anaesthetised with local anaesthetic and the wart and an area of 3-4 mm of normal surrounding skin treated with a Candela SPTL-1b pulsed dye laser using a 7mm spot and a fluence of 10 J/cm2, with 3-4 passes over each area. The purpose of this being to cause photocoagulation of the superficial capillaries supplying the wart, and to induce thermal injury to the basal epidermis and dermo-epidermal junction. Immediately after this, a small volume of bleomycin (0.5 iu/ml) depending on the size of the wart, was injected into the base of the wart using a 30G needle in order to cause separation of the wart from the dermis and instill the bleomycin solution into this space. A dry dressing was applied which was removed the next day and replaced as appropriate.
In five out of the seven subjects the warts had completely resolved at one month follow-up. The remaining two subjects who were taking immunosuppressive therapy required a repeat treatment at 2 months which proved successful. All patients have been free of recurrence 3 months after clinical resolution, and follow-up is continuing. All patients tolerated the procedure very well. Blistering and crusting lasted an average of 2 weeks but was easily managed with simple dressings if required. No serious side effects were reported, and no significant scarring seen.
The pulsed dye laser as well as treating the wart in its own right enables rapid and effective administration of bleomycin with ease to the base of the wart, where it is required. There is minimal risk of unwanted infiltration of bleomycin into normal dermis or contamination of the operative environment.
Pulsed dye laser followed by bleomycin appears to be a safe, rapid, well tolerated and successful treatment for resistant hand warts previously untouched by other therapies. These observations need confirmation from a larger controlled study.

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TREATMENT RESPONSES OF SCARS OF VARYING AGE USING THE 585 nm PULSE DYE LASER

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The pulse dye laser interferes with collagen formation in immature scars through selective destruction of the microcirculation, which presumably impairs the function of fibroblasts. If this is true, a diminishing response to pulse dye laser treatments over time would suggest that, as the fibroblastic phase of wound healing abates, *the target organ is lost.* This would help explain the mechanism of action of the pulse dye laser on scars.
Similar treatment protocols were used for primary scars (n=150), early hypertrophic scars (n=21), and late hypertrophic scars (n=49). The results of treatment were analysed and correlated with representative histologic examinations.
The quality of the eventual scar directly correlated with timing: *primary* treatment results were better than *early hypertrophic scars* which were better than the results of the *late hypertrophic scars.* The time of initiation of treatment was the most critical factor in achieving a satisfactory response.
CONCLUSIONS:

(1) Pulse dye laser treatments are more effective if started within the first few weeks following injury
(2) Early hypertrophic scars are easier to treat than late hypertrophic scars.
(3) Some late hypertrophic scars are unresponsive to laser treatment alone, and should be treated with surgical revision *followed by* pulse dye laser treatments of a newly revised scar.
(4) A clinical correlation between the state of fibroblastic activity and the effectiveness of pulse dye laser treatments is suggested.

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SUCCESSFUL TREATMENT OF POIKILODERMA OF CIVATTE UTILIZING THE PULSED DYE LASER.

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To evaluate the efficacy of the pulsed dye laser in the treatment of Poikiloderma of Civatte utilizing the Candela pulsed dye laser at 4 - 4.25 J/cm^2 with a 10 mm spot size.

15 patients with Poikiloderma of Civatte with skin types ranging from type I to type IV were treated with the pulsed dye laser. Three to five treatment sessions were performed with this laser over the entire affected area. A photographic analysis was performed following completion of treatment.

Pulsed dye laser photocoagulation of Poikiloderma of Civatte resulted in dramatic clearing or removal with an absence of scarring or pigmentary change.

Pulsed dye laser photocoagulation of Poikiloderma of Civatte is safe and extraordinarily effective.

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Is the pulsed dye laser safe and effective for treatment of port-wine stains in pigmented skin?

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Pulsed dye laser (PDL) treatment is well established for port-wine stains (PWS) in patients with skin types I-IV, but little information is available for darker skin types. Increased laser light absorption by the epidermal melanin in these patients could potentially result in reduced treatment effect and increased risks of side effects such as pigment disturbance and scarring.
We have treated 13 patients of skin type V with a PWS, using a total of 97 PDL treatment sessions (mean 7.5 per patient). In 2 patients the response was excellent (complete or near complete clearing), in 4 each good or moderate, in one slight and in 2 poor. Hyperpigmentation occurred in 46% of patients and hypopigmentation in 7.8%, which was improving despite continuing treatment. Limited atrophic scarring was seen in 2 patients.
Although treatment results were less good and side effects more frequent than have been described in lighter pigmented skin, 46% of the patients achieved a good or excellent response and the majority (87.6%) of the 97 treatments performed in these 13 patients were not associated with significant adverse effects. We conclude that patients with a PWS and skin type V should not be excluded from PDL treatment, provided that treatment expectations and risks are fully discussed.

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ND:YAG LASER TREATMENT OF PHARYNGEAL LYMPHANGIOMAS

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Purpose: Giant cystic lymphangioma of the neck are characterized by hundreds of cysts that infiltrate in and around muscles, nerves, and

vessels. Complete excision is not possible without damaging the normal structures. Involvement of the pharynx and supraglottic larynx presents the risk of airway obstruktion.

Patients and Methods: From 1984-1998 sixteen infants with involvement of the pharynx were treated using Nd:YAG laser 1064 nm. With the use of Laryngoscope n.WEERDA is possible to operate bimanually. The 600 µm bare fiber was introduced via bronchoscopic suction instrument. Since 1996 the abblation mode allowed effectiv resection. A short (0.2 sec.) initial high power (100 W.) induce carbonization. In this carbonized area, tissue becomes abblated by 30 W power (non contact; 0.8 sec. exposure time; 1 sec. interval).

Results: All infants had partial removal. The Nd:YAG laser allows precise excision of individual cysts. The number of interventions ranged from 2 to 6. Except one infant tracheostomy was not neccassary. Two patients have required additional partial glossectomy.

Conclusion: Despite the extensive nature of these lesions the Nd:YAG laser therapy of pharyngeal lymphangioma is mandatory.

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EQUIVALENT DEPTH RESURFACING: A CLINICAL AND HISTOLOGIC EVALUATION OF ERBIUM:YAG, CARBON DIOXIDE AND COMBINED LASER PROCEDURES.

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The relative safety and efficacy of erbium:YAG (erbium) and carbon dioxide (CO_2) laser resurfacing is unclear because few studies have analyzed these systems with "equivalent depth" procedures. The purpose of this study is to investigate the clinical effects and wound healing following "equivalent depth" erbium, CO_2, and combined erbium - CO_2 laser resurfacing.

Nine patients were treated with either erbium (n=3), CO_2 (n=3) or combined erbium - CO_2 (n=3) lasers. Follow-up examinations, including photographs and biopsies were obtained on days 0,1,5,30,70 following treatment.

Clinical outcomes were analyzed with respect to degree of improvement, time to reepithelialization, pain, infection, pigmentary change and scarring. Patient biopsies were used to analyze the depth of wounding, inflammation, wound repair and dermal remodeling after treatment.

The clinical effects and process of wound healing following "equivalent depth" laser resurfacing with erbium, CO_2 and combined erbium - CO_2 lasers are discussed.

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MULTIPLE ER:YAG LASER SESSIONS FOR THE TREATMENT OF DEEP RHYTIDES. David J. Goldberg, New Jersey Medical School and Skin Laser Center, Pascack Valley Hospital, Westwood, New Jersey.

CO_2 laser resurfacing is felt by many to be more effective than Er:YAG laser resurfacing for the treatment of Class III rhytides. This study was designed to determine whether multiple Er:YAG laser sessions lead to progressive improvement in deep rhytides. 15 subjects with Class III rhytides received 3 sessions of Er:YAG laser treatment. Sessions were undertaken at 3 month intervals. All subjects were evaluated for clinical improvement during the study and at 6 months after the final treatment. All subjects showed progressive improvement with continued treatment. Transient hypo and/or hyperpigmentation was seen in 6 subjects. No scarring was noted. Er:YAG laser treatment can be helpful in the treatment of Class III rhytides. Multiple sessions may be necessary for the best results.

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SHORT AND LONG TERM SIDE EFFECTS FOLLOWING ERBIUM:YAG LASER RESURFACING OF SCARS AND RHYTIDES.

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To evaluate the short and long term side effects of erbium:YAG laser resurfacing following the treatment of scars and rhytides utilizing the erbium laser with a 5 mm spot at 1-2 J/cm^2 with 2 - 10 passes over the treated area.

50 patients were treated for their scarring or facial rhytides and evaluated for the presence of atrophic or hypertrophic scarring, pigmentary change, viral or bacterial infections, chronic dermatitis, acne and milia.

Long term side effects following erbium:YAG laser resurfacing are negligible and insignificant. Short term side effects include post-operative erythema and a small incidence of hyperpigmentation.

The erbium:YAG laser provides a high safety profile over the short and long term in the treatment of scars and rhytides when used properly.

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COMPARISON OF ER:YAG ALONE WITH ER:YAG WITH SIMULTANEOUS LOW ENERGY CO_2 FOR PERIORAL RESURFACING

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Twenty patients were treated with a combination of Erbium:YAG (21.2 J/cm2, 350 µsec pulse) with CO2 laser (3W, 30 msec pulse, 3mm spot) by simultaneous application (Derma K, ESC/Sharplan, Needham, MA). Results were compared with Er:YAG alone in 30 patients at 4 months follow-up. Identical fluence for Er:YAG was utilized in all patients. Histologic studies on depth of injury were also performed. Clinical results were judged by comparison pre- and post-treatment photographs.

Results demonstrated 25 – 50% improvement for Er:YAG alone in the perioral region, while the combination of Er:YAG and CO2 achieved 50-75% improvement in the majority of patients. Erythema was prolonged by 8 days (range 30 days) in the combination group and re-epithelization was prolonged by 24-36 hours. No scarring or pigmentation changes were observed in either group. Histologic studies show dose controlled increased thermal

and ablative effect with the addition of CO2 more than with Er:YAG alone. Capillary bleeding was less frequent with the combination therapy which was validated by histologic data. Initial results with the combination Er:YAG and CO2 device demonstrates improved efficacy over Er:YAG alone. Combination Er:YAG/CO2 still permitted use of topical anesthesia alone as the primary means of anesthesia for regional resurfacing. We conclude that cosmetic results improve but morbidity does not significantly increase with a novel system of simultaneous delivery of low-dose CO2 along with high fluence Er:YAG laser.

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SKIN RESURFACING WITH A COMBINED ER:YAG/CO2 BLEND MODE LASER

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The purpose of this study was to evaluate the effects of a skin resurfacing laser combining CO2 and Erbium wavelengths on both the time required for skin reepithelialization and the duration of erythema.

The K-Blend mode technology (Derma K, ESC/Sharplan) simultaneously combines a pulsed Erbium and a pulsed, subablative CO2 laser to achieve desired results. Thirty-five patients with skin types I-IV were treated on the face. Treatment of fine wrinkles was performed with 2 passes of Erbium at 14-21 J/cm2 and 1-2 watts of CO2 for a time duration of 30-50 ms. Deeper wrinkles were treated with 2-3 passes with an increase in the CO2 power level to 3-4 watts for a duration of 50 ms. An integrated scanning pattern generator using spot sizes of 3 mm was employed.

Clinical improvement was observed in all patients. Total reepithelialization was achieved in all patients in 3-5 days. Erythema was mild and persisted on the average for 2-4 weeks. One type IV patient developed transient hyperpigmentation in one small area which resolved with treatment within 3 months. The use of the CO2 wavelength resulted in total hemostasis. Mild to moderate immediate skin contraction was observed with higher CO2 levels.

Thus, the K blend mode technology appears to combine for skin resurfacing the benefits of both Erbium and CO2 lasers (hemostasis, faster healing, shorter period of erythema, skin contraction) and, at the same time, minimizes the side effects and complications of both lasers.

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THE ER:YAG LASER AS A SOFT TISSUE INCISIONAL DEVICE

Authors: Brian S. Biesman, Nashville, TN. Eric Bernstein, Philadelphia, PA

The carbon dioxide (CO_2 10,600 nm) laser emits in the far infrared region of the EMR spectrum and is useful for performing soft tissue incisional surgery, creating a nearly bloodless field. Critics of laser incisional surgery believe that the 200μ zone of thermal damage surrounding the incision produces excessive scarring and a weaker wound.

The Erbium:Yttrium-Aluminum-Garnet (Er:YAG) laser also emits in the infrared portion of the EMR spectrum (2940 nm). The Er:YAG laser penetrates soft tissue less deeply but also produces a much smaller zone of thermal damage which is insufficient to provide hemostasis rendering this laser inadequate for soft tissue incisional surgery.

The Er:YAG laser pulse width can be lengthened to deliberately increase thermal damage. When a beam such as this is focused to a small diameter, soft tissue incisional surgery may be performed successfully with the Er:YAG laser.

We studied the histopathologic effects of the Er:YAG laser on an ex-vivo human eyelid skin model. An Er:YAG laser was used to make incisions on the fresh tissue using a focused handpiece at variable of parameters.

The Er:YAG laser successfully cut eyelid tissue in this model. Quantification of thermal damage at the wound edge will be described.

We conclude that the Er:YAG laser may be useful for performing soft tissue incisional surgery. In vivo studies are needed to further evaluate the ultimate clinical benefit of this device.

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EYELID SKIN HEALING FOLLOWING PERIORBITAL ERBIUM:YAG LASER SKIN RESURFACING

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Purpose: To describe the *in vivo* healing of eyelid skin following periorbital skin resurfacing with the Erbium:YAG laser.

Methods: Eight patients, 4 male and 4 female, aged 45-78 (mean 62) who met strict inclusion and exclusion criteria were offered laser skin resurfacing. Patients all received the same perioperative skin care regimen and all had Fitzpatrick skin types I-II. Patients underwent standard Erbium:YAG laser skin resurfacing (<350 *u*sec duration, 5 J/cm^2 fluence, 3 mm handpiece, 3-6 passes, ConBio Medical Corporation). Patients consented to allow punch biopsies at 1, 2, 4 and 12 weeks after laser resurfacing. The biopsy specimens were evaluated by a dermatopathologist (RGP) who was masked to the study parameters. Standard histopathologic analysis included hematoxyllin-eosin, luna and EVG stains.

Results: Re-epithelialization generally occurred within 7 days. In the epidermis, the initial acanthosis, polarity atypia, loss of melanocytes and flattening of the rete pegs greatly diminished within 3 months. In the dermis, stromal edema, inflammatory infiltration, collagen deposition, and elastic changes also gradually diminished within 3 months. When compared to biopsy specimens of patients who had undergone periorbital CO_2 laser resurfacing, these specimens demonstrated significantly less inflammation, coagulative changes, and scarring.

Conclusion: After Erbium:YAG laser resurfacing, eyelid skin healing is similar to that reported in other facial skin regions. Moreover, at the laser settings used herein, there is significantly less dermal remodeling than following CO_2 laser resurfacing.

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LASER RESURFACING INFECTION RATE WITH AND WITHOUT PROPHYLACTIC ANTIBIOTICS

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PURPOSE: The purpose of this study was to identify the rate of postoperative bacterial infection following full face CO_2 laser resurfacing with and without antibiotic prophylaxis.

METHODS: A retrospective analysis of 130 consecutive full face CO_2 laser resurfacing patients was performed. The rate, severity, and duration of infections observed in four treatment categories were recorded:

(1)no antibiotic prophylaxis
(2)intraoperative single-dose intravenous cephalexin
(3)postoperative oral azithromycin (5 day course)
(4)intraoperative IV cephalothin and postoperative oral azithromycin

RESULTS: A significantly higher rate of infection occurred in patients receiving combination intraoperative and postoperative antibiotic prophylaxis. Most commonly cultured organisms included Pseudomonas and Serratia species.

CONCLUSION: The rate of postoperative infections following full face CO_2 laser resurfacing is not significantly reduced with the use of prophylactic antibiotics. Not only was the rate of infection higher in the prophylactic antibiotic treatment groups, but the organisms were of a more pathogenic nature.

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THE TREATMENT OF LOWER EXTREMITY RETICULAR VESSELS USING A MULTI-SEQUENTIAL LONG-PULSED Nd:YAG 1064 nm LASER

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PURPOSE: The objective of this study was to evaluate the effectiveness of the treatment of lower extremity reticular vessels using a multi-sequential long-pulsed Nd:YAG 1064 mn laser.

METHODS: Twenty patients (>18 yrs) with lower extremity reticular vessels were included in the study. Patients were classified according to skin type(I-IV) and to vessel size. Vessels sizes were grouped into Class 1(1-2 mm); Class 2(2-3 mm) and Class 3(3-4 mm). Each patient received multiple treatment sessions at 4 week intervals. Sequential and clinical graded scores were obtained preoperatively and at four week intervals post-operatively.

RESULTS: Clinical improvement was observed in all lower extremity reticular vessels using the long-pulsed Nd:YAG 1064 mn laser.

CONCLUSIONS: Lower extremity reticular vessels can now be treated effectively with a long-pulsed Nd:YAG 1064 nm laser.

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MULTIPLE SAME SITE SAME SESSION APPLICATIONS OF VASCULIGHT™

Ronald G. Bush, Karin Hammond, Dayton, OH

This study was carried out using the Vasculight™ laser by ESC Medical Systems to determine its safety and efficiency in the closure of veins less than 3 millimeters in size with multiple applications of energy at the same site and at the same settings in the same session. Energy delivered to the targeted vein was 150-155 J/cm at 14-16 msec duration. Closure was confirmed by duplex exam or Doppler auscultation in all cases. The procedure was performed in the same location until closure occurred. From one to seven applications were necessary to each site targeted. Intervals of application were 6-8 millimeters. Our results in over 100 cases are presented. Ninety percent of veins less than 3 millimeters were closed within 3 applications to the same site in the same session. At no time were any adverse reactions noted. There were no adverse epidermal or subcutaneous responses. We conclude Vasculight™ is highly effective if used properly and very safe for the patient.

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THERAPEUTIC VIDEOSCOPY AND COMBINED LASER-SCLEROTHERAPY OF THE LOWER LIMBS TELANGIECTASES: FOLLOW UP

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Purpose of our study is summarising why, when and how the use of laser beams is rational in the treatment of the telangiectases of the lower limbs.
From many years we are investigating in this sector, and methods and results have been already presented in many International Meetings and magazines.
Now, we are controlling the follow-up of the cases treated with videocapillaroscopy and combined laser sclerotherapy, in the last three years.
The incidence of relapses is significantly less, compared to same types of telangiectases treated with sclerotherapy or lasertherapy alone, and without videocapillaroscopy.
Some differences we noted changing the wavelength of the laser (488, 532 nm). The sclerotherapy used have be always the same (2.5 ml of Stemmer's solution).
In conclusion, the combined laser sclerotherapy done in videocapillaroscopy allows a better elimination of all the types of lower limbs telangiectases, and the maintenance of the results for long time.Further study could be establish the best wavelength of laser using in each type of telangiectases.

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EFFECTS OF VITAMIN K CREAM ON LASER INDUCED PURPURA

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Systemic vitamin K is critical in the clotting cascade, but little is known of the effects of topical vitamin K. This study was designed to assess the effects of topical vitamin K on laser induced purpura. Specifically, the development and resolution of purpura were assessed.

Laser pulses at pre-determined purpura-producing fluences were delivered to five sites (1.5cm diameter each) in each of the twenty subjects. Five different formulations of vitamin K as well

as a vehicle control were tested. The subjects applied a different formulation to each test area twice daily for 2 weeks before laser irradiation and for 2 weeks after. Areas were assessed at day 1, 3,7,10, 14 after purpura induction.

The results showed that the reduction in purpura was up to 10% at day 1 post-irradiation and up to 50% by day 14 post-irradiation.

A topical vitamin K formulation applied prior to laser treatment appears to decrease the amount of purpura produced compared to untreated controls. Topical vitamin K does not appear to promote the resolution of the purpura.

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LAPAROSCOPIC LASER TREATMENT OF RETROPERITONEAL LYMPHANGIOMAS

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Background and Objective: Retroperitoneal lymphangiomas are rare congenital vascular malformations. They cannot always be excised completely and are associated with high recurrence, complication and morbidity rates.

Study Design/ Patients and Methods: Therefore an alternative concept of treatment is used since 1996. Laparoscopic excision of the lymphangioma has been performed in 6 patients using Nd:YAG laser 1064 nm. The 600 µm bare fiber was introduced via a special instrument, which allows angulation of flexible light conductor.

Procedure	Mode	Application	Power	Exposure	Interval
Excision	fibertom	contact	30 W	continuous	no
Devitalisation cystground	standard	noncontact	35 W	0.3 sec.	0.5 sec..
Interstitial lasertherapy	ILT	contact	7 W	continuous	no

Cyst walls are resected as much as possible, but avoiding the damage of adherent structures. Cyst ground was devitalised with non contact irradiation. Additional interstitial laser treatment (ILT) was applied under magnetic resonance imaging (MRI) control .

Results: We excised two lymphangiomas complete and four subtotal. Operation time was 50-150 minutes. Blood loss was between 10-50 ml. Hospital stay was 2-5 days. MRI control studies 3 month after the procedure showed one residual cyst after subtotal excision, which was treated by percutaneous ILT.

Conclusion: Minimal invasive laser treatment takes part in the treatment protocol of retroperitoneal lymphatic vascular malformation.

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Experience in Treatment of Facial Vascular Lesions with the High Power KTP Laser

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A number of lasers have been advocated for the treatment of vascular skin lesions. However, until recently, it has not been possible to combine the theoretical advantages of a large spot relative to target vessel size, and pulse widths which match the thermal relaxation times of across the range of vessel sizes seen in cutaneous vascular lesions. With the introduction of higher power KTP lasers for dermatologic applications, it has become possible to treat vascular lesions with spot sizes ranging from 1-4mm, and pulse widths from 1-50msec using the same laser. We present our experience in using the orion laser system (Laserscope) for the treatment of port-wine stain malformations resistant to previous laser therapy and facial telangiectasia.

The laser used was an orion 20/50 laser which has an output of 20 watts at 532nm. Forty-three patients with facial vascular lesions have been treated to date, consisting of 11 patients with pulsed dye laser resistant port-wine stains, and 32 patients with facial telangiectasia (25% idiopathic, 35% rosacea, 34% solar damage, 3% steroid induced, 3% hereditary haemorrhagic telangiectasia)

Of the patients available for evaluation, 64% had a good, 18% a moderate and 18% a poor response. The fluences used ranged from 8-50J/cm^2 , with a pulse width of 1-50msec and a 1-4mm spot size. The treatment was very well tolerated without anesthesia. Blistering and crusting occurred infrequently and were short-lived. Purpura, which is a troublesome effect of pulsed dye laser treatment, was not seen. Permanent adverse effects were not noted.

We conclude, that the high power KTP laser provides effective and safe treatment for many patients with a wide range of facial vascular skin lesions. With these lasers, the pulse width and spot size can be easily manipulated to optimize individual treatments depending on vessel size. Selection of appropriate treatment variables based on clinical lesion type and clinical appearance will be discussed.

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ANGIOLYMPHOID HYPERPLASIA WITH EOSINOPHILIA CAN BE TREATED WITH LONG PULSE TUNABLE DYE LASER.

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We report a case of angiolymphoid hyperplasia with eosinophilia (ALHE) treated with the long pulse tunable dye laser. S.G., a 46 year old female was diagnosed with ALHE on her right temporal scalp in May 1998 after biopsy revealed the classic histologic findings. As the majority of the blood vessels extended between .20 - 1.25mm from the granular cell layer, she was treated with the Candela Scleroplus laser set at 595nm, 8.5J/cm^2 using the seven millimeter spot size handpiece and the Dynamic Cooling Device. The lesions flattened out in a single treatment and cleared after a second treatment. To our knowledge, this is the first reported case of AHLE to be treated with this modality. We feel that the long pulse tunable dye laser offers an excellent option to surgical excision for this condition.

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STERILIZATION EFFECT OF THE ABRASION LASER (Er-YAG LASER & ULTRAPULSE CO_2 LASER)

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Despite of frequent clinical applications of the abrasion laser, reports on its bactericidal effect have been scarce. We have been utilizing the abrasion laser for the granulation tissue debridement of the skin ulcers. We investigated the surface sterilization potential of the laser irradiation, using an experimental model.

Material and Methods

1) Counting the number of surviving MRSA in the laser irradiated field

MRSA (methicilline-resistant staphylococcus aureus cultured in our laboratory) suspension on the geliperm (polyacrylamide containing 96% water, Geistlich) was used for this study. We utilized the Er-YAG laser (AESCULAP, MCL29) and ultrapulse CO2 laser (COHERENT, UltraPulse 5000c). The target bacteria, MRSA

(10 μl) on a 5 mm square geliperm was irradiated 1-5 passes by Er-YAG laser (250 mJ /cm², 5 mm spot size, 4 shots with overlapping) or ultrapulse CO2 laser (250 mJ /cm², 3 mm spot size, using Computed Pattern Generator with 50 % overlapping). After laser irradiation, each geliperm was transferred to a sterile medium and incubated, to count the surviving MRSA.

2)Electron Microscopic Findings of the MRSA in the laser irradiated field

Morphological changes were studied by Electron microscopy after irradiation.

Results

1) 5.74±0.01 CFU/UT was collected from the control gel without irradiation. Table shows the number of surviving MRSA collected from each gel.

	1 pass	2 passes	3 passes	4 passes	5 passes
Er-YAG	4.48±0.32	2.28±0.03	-	-	-
Ultrapulse-CO2	4.62±0.24	4.45±0.05	4.07±0.03	3.06±0.12	-

* CFU/UT: colony forming unit / unit (log), - : < 200 CFU / ml

2) Electron microscopic findings revealed molten or broken staphylococci in the irradiated field.

Conclusions

This study showed that the abrasion laser reduces the surface bacteria and suggested the sterilization ability of sterilize the infected skin ulcer, granulation tissue and so on. The application of the abrasion laser as a preoperative treatment for an infected wound or ulcer seems to be worth while.

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PSYCHOLOGICAL AND CLINICAL IMPROVEMENT OF ACNE SCARRING FOLLOWING ULTRAPULSE LASER RESURFACING

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Between 80-95% of patients who attend a dermatology clinic with acne show some degree of scarring, which is often associated with significant psychological morbidity. Dermabrasion of acne scars has often achieved limited success but with the advent of a new generation of lasers such as the ultrapulse laser and the erbium yag laser, the ability to resurface the skin with greater precision is possible.

Several studies have reported improvement in acne scarring with these lasers. However, there have been few studies looking at the psychological impact of the treatment of the patient and the use of objective methods of measurement such as 3D sillicon replicas.

We treated 8 patients with atrophic acne scars, 7F:1M, Mean age 32.5 years (21-49). All patients were treated with a Coherent ultrapulse laser using the computer pattern generator and energies of 250-450mj. The cheeks were treated in 6 patients and the chin in 2 patients. 15 sites were treated (chin 4 and cheek 11). Pre and post treatment sillicon replicas were taken and were assessed by 7 blinded observers. They were graded on a scale from 1-10 based on the number, height and density of scars. The Disability Life Quality Index (DLQI) which had been modified for acne scarring was answered by the patients prior to treatment and at follow up 12 weeks later. 6 out of 8 patients had pre and post DLQI's and there was a significant improvement in the DLQI post treatment (median score 13 pre Rx vs 6 post Rx - max 30) P<0.2. There were no adverse effects other than erythema at the treatment sites which faded over 2-3 months. The assessment of the sillicon moulds showed a significant change in 6 patients which no improvement in 2 patients. The median grade of the replicas taken from the 15 sites pre-treatment was 4.4 (2.4-7.4) and post treatment at 12 weeks was 3.6 (1.1-5.1) and the difference was significant (P<0.03).

This study shows that ultrapulse laser resurfacing produces significant objective improvement which is associated with significant psychological benefits.

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LASER SKIN RESURFACING UTILIZING A COMBINATION ERBIUM: YAG/CARBON DIOXIDE LASER SYSTEM

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Laser skin resurfacing has evolved over the past several years from carbon dioxide laser systems to erbium:YAG laser systems. A new duel-mode machine, utilizing the erbium:YAG laser and a sub-ablative carbon dioxide laser system cycled into the mix has now emerged into the fray of medical devices for laser skin resurfacing. The rationale for a duel system will be reviewed as well as clinical results from a controlled clinical trial which demonstrate the efficacy of this modality. Better laser resurfacing is shown with the erbium:YAG laser without the potential of long-term sequelae as has been shown with the carbon dioxide laser. The duel mode erbium:YAG/ carbon dioxide laser resurfacing system is a worthwhile tool for effective laser resurfacing.

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LASER-RESURFACING TECHNIQUE: NEW INDICATIONS

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Purpose of our study is to use the laser resurfacing technique to improvement course and recovery of pathologies where a soft dermabrasion is desiderable.

From two years we are doing a surgical detersion of cutaneous necrotic ulcers (20 cases) using a superpulsed CO2 laser with butterfly -touch system, fluence of 400 – 600 mJ for pulse, and spot of 12 mm. Advantages of this method are the absence of the pain during and post-treatment, the possibility to see the tissue layers during the intervention, the minimal bleeding and the conservation of the reparative tissue on the margins of the lesion. The recovery time of these lesions decrease significantly, compared to similar lesion treated with surgical cleaning with cutting.

Disadvantages are the plumes and nasty smell, rather than the costs of the instrumentation.

We are evaluating the frequency of the relapses.

In conclusion, laser resurfacing technique could be the elective treatment for surgical detersion of the cutaneous ulcers, if our data will confirmed by further studies.

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UPDATE ON THE PENDULASER SYSTEM COMPARED WITH FOUR OTHER CARBON DIOXIDE LASERS FOR TREATING FACIAL RHYTIDES AND SUPERFICIAL ACNE SCARS

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We recently reported successful treatment of facial rhytides and superficial acne scars with the Pendulaser system, a 15 Watt CO_2 laser with an OptoScan™ scanning device. Now, after considerably longer follow-up of up to one year, we are able to summarize our additional experience with the study population. The Pendulaser system was used to treat 16 patients: 7 for acne scarring, 9 for perioral rhytides, and 3 for periorbital rhytides. The vast majority of patients were treated with settings of 5 Watts and .396 density in 3-4 passes. However, five patients were treated with higher power up to 10 Watts and greater density of up to .413. One patient was treated with only 2 passes. In order to compare the Pendulaser system to established CO_2

laser technology, we treated four additional patients with the TruPulse, FeatherTouch, UltraPulse, and SilkTouch systems. According to experienced dermatologic evaluation of the Pendulaser treated patients, 30% experienced slight improvement of rhytides or acne scarring within a designated severity category (none, mild, moderate, severe), 30% experienced significant improvement to the next lower severity category, and 40% experienced dramatic improvement across more than one severity category (e.g. severe to mild). No scarring was observed.

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FACIAL RESURFACING WITH THE ERBIUM: YAG LASER. MI Perez, DE Bank, and D Silvers. Columbia University Dermatology Dept. and St. Lukes-Roosevelt Medical Center, NY, NY.

In this study, specific parameters for Er: YAG laser treatment of rhytides Class I-III, actinic damage, and acne scars, were evaluated clinically and histologically. Fifty patients were treated with the Er: YAG laser. Perioral, periorbital, and full face rhytides Class I-III, actinic damaged facial skin, acne scarring were treated. All patients received multiple passes of 5-6.4J/cm^2 to the treated areas. The patients were evaluated daily for 7 days, weekly for 2 months, and monthly for a year for healing time, resolution of erythema, improvement of the primary condition treated, and pigmentary changes. Histologic samples of areas previously treated were obtained at different time intervals after healing. Histologic evaluation of ex-vivo skin was done to determine the level of penetration of multiple passes of Er: YAG laser in human facial skin. Al patients showed some degree of improvement. Reepithelialization occurred between 3-8 days. Erythema resolved between 6-8 weeks. The level of tissue ablation was determined to go down to: the granular layer after one pass, the basal cell layer after two passes, dermoepidermal junction after three passes, papillary dermis after four passes, deeper papillary and superficial reticular dermis after five to six, and mid-reticular after seven passes. One year after Er:YAG laser resurfacing of the perioral and cheek regions there was evidence of new collagen formation at the level of the papillary dermis. The Er:YAG laser plays a significant role in the treatment of facial rhytides Class I-III, actinic damage, and acne scars.

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The use of acexamic acid associated with vitamin E and others. Open dressing pos-resurfacing and early disappearance of erithema.

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Mônika Brandão Siuves de Oliveira, Dermatology-Resident.

The open dressing pos-resurfacing with acexamic acid (sodium acexamate), vitamin E 4%, vitamin A 50000 U.I, alfabisabolol, 0,5%, azuleno 0,025% in vaseline (petrolatum) 120g, have shown extremaly efficient in reducing the erithema pos-resurfacing (the recuparation time is approximately 21days), accelerate the reepilization and provide protection and a relief feeling in relation to external damage (pollution,cold, wind,heat) so reducing the painfull phenomenon after surgery,

After several ocluded dressings have been avaliated, their cost, cost-benefit relation and complications, we decided to start the use of the open dressing as an alternative solution.

We analised the product effectiveness in relation to the pain relieve and pos-operatory burn, reducing of erithema and reepitelization, besides possible complications.

For our satisfaction the open dressing effectiveness, as proposed by us, have shown to be much better than the ocluded dressings. In all patients that we have used the open dressing we had the following clinic evolution: erithemas reduction in about 21 days (after 7 days the faces aspect is near the normal), painfull relieve and protection sensation against the colds, wind, heat and pollution. The reepitelization occurs between 7th - 10th day.

According to a pharmacological appreciation of the formula's components,the effectiveness and the success of open dressing proposed by us due to:

1) Reepitelizant and stimulant activy of granulation from acexamic acid.
2) reducing in 50% the recuperation time on the area burn by the Re-Yag laser, given by the vitamin E .
3) The reepitelizant and antioxidant vitamin A action.
4)The Antinflamatory and sedative action of the azuleno and alfabisabolol.

In relation to the azuleno: besides the terapeutic action, it's blue color helps to show the difference betweend ointment and fibrine secretion at the burn area.

Our directions to the patients is always keep wet operated area to avoid the skin dehydratation, crust formation, and protect the area against external agents (pollution, cold, wind , heat), making easy the fibrine remotion at the daily dressing and so avoiding the skin damage.

This damage cause a delay of the erithema's reducing time.

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LASER SKIN RESURFACING AND THE ULTRASTRUCTURAL AND IMMUNOHISTOCHEMICAL ASPECTS OF MIDDERMAL WOUND HEALING. Erik Austin, Western University of Health Sciences, College of Osteopathic Medicine of the Pacific.

Laser therapy is time-efficient and has provided the convenience of bloodless surgery although this hemostasis is necessarily achieved through thermal necrosis. Hence, it is important to continue to investigate the course and dynamics of wound healing. This paper aims to fill a void in the dermatologic literature for a research review in the area of middermal wound healing.

Skin wound healing is commonly assessed by measuring the time needed to epithelialize the wound surface or by measuring the tensile strength of a wound. This paper discusses recent developments in the achievement of maximal wound healing, citing research using various animal models.

Research is also presented on the ultrastructural and immunohistochemical evaluation of wound healing, comparing dermabrasion with laser therapy. It is concluded that the ideal laser procedure should necessarily seek to maximize wound healing at the ultrastructural and immunohistochemical levels and that laser therapy procedures should be designed and timed to facilitate these biochemical phenomena essential to healing.

Additional research is required in the mechanisms of laser therapy effectiveness and on the precise micro-anatomical and biochemical changes which occur as a result of various CO_2 laser technologies and treatments.

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THE USE OF LOW LEVEL LASER THERAPY FOR WOUND HEALING: CLINICAL STUDY

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ABSTRACT

The benefits of Low Level Laser Therapy have been reported since early 60's by Mester (Mester and al.1989), and were firstly mentioned in the medicine and were related to the improvement of quality and reducing the time of wound healing.

Its effect on biological tissue is relatively well known and includes improvement of local micro - circulation (Meshalkin YeN et al, 1983), stimulation of the lymphatic system (Lievens, 1991), epithelial and fibroblast cells stimulation with consequent increase of collagen synthesis (Steinlechner et al, 1993; Abergel, 1986; Enwemeka et al, 1990).

The laser works direct and specifically in four levels to improve tissue healing: on inflammation, granulation tissue formation, tissue remodelling, and on the extra cellular matrix (Lievens, 1991). We also know that laser light acts differently on the inflammation according to the stage in which the treatment is used (El Sayed et al, 1990).

Based upon laboratoral results (Almeida-Lopes el al, 1998), the authors investigated 200 human patients, after surgical removing oral pathologies using low level laser at the post-operative period. The laser used was diode lasers of two wavelengths: 635 nm and 780 nm (the same wavelengts used in the laboratoral study).

This study indicates that IR and visible laser light has a clinical benefit on wound healing as shown on the reduction of the healing time as well as on the quality of the scar tissue. There was no clinical difference between patients irradiated with 635 and 780nm laser light.

Key Words: low level laser therapy; wound healing; fibroblasts

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TREATMENT OF ACNE WITH PHOTODERM

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PURPOSE To evalute efficency of Photoderm VL/PL for treatment of active acne lesions and reduce scarring.

METHODS: Three patients with severe acne lesions unresponsive or poorly responsive to tradional treatment were selected and treated with Photoderm VL?PL. The first treatment utilized default settings for facial teleangectasia and subsequent treatments were at default settings for pigmented lesions epidermal type. All the patients were skin type 1. Only the active acne lesions were treated and unaffected skin was left untouched.

RESULTS: Clinical improvement was dramatic. The Photoderm not only destroyed the acne lesions but also stopped the the scarring. The resultant skin was smooth and no reoccurrence of the acne lesions treated were noted. None treated areas continued to have acne and subsequent treatment to those lesions had the same positive results.

CONCLUSION: Photoderm is an effective treatment for acute acne and will prevent scarring and reoccurrence of the acne lesions. It can be effectively used as a first line treatment and may not require concomitant use of antibiotics and other traditional acne treatments.

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EFFECTS OF COOLANT ON DENTAL ABLATION WITH THE CO_2 LASER AT 9.3 μm

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The bond between the tooth and filling material determines the durability of the filling. This interface is related to the morphology of the cavity surface. A wide range of surface morphologies can be produced on the tooth surface by laser irradiation. However, laser-induced thermal effects can damage the tooth and its supporting structures. The aim of this study was to determine the effects of laser drilling with and without coolant on dentin and enamel surfaces. Freshly extracted teeth were drilled using the CO_2 laser at 9.3 μm (Clinicon, Carlsbad, CA) at five different parameters: Superpulse (SP)@3W, SP@4W, SP@5W, SP@6W, and Gated Continuous Wave (CW)@2W. The laser was used without coolant and with an air:water spray ratio of 1:1. Scanning Electron Microscope (SEM) evaluations of the residual surfaces were performed. SP@5W with a 1:1 air:water spray provided optimal results. At other parameters, inadequate ablation or thermal damage were observed. In conclusion, the CO_2 laser emitting at 9.3 μm at a Superpulse power setting of 5W and an air:water spray ratio of 1:1 can effectively and safely be used for cavity preparations.

This study was supported by the UCI Undergraduate Research Opportunities Program (UROP), DOE grant DE903-91ER 61227 ONRN00014-90-0-0029, and NIH RR01192.

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MICROLEAKAGE EFFECTS BETWEEN CO_2 LASER MODIFIED TOOTH SURFACES AND THE GLASS IONOMER CEMENT INTERFACE

Linh Nguy, Young Yoon, Petra Wilder-Smith

The aim of this study was to test the effects on microleakage of tooth surface modification using a CO_2 laser emitting at 9.3um (Clinicon, Carlsbad, CA.). Standardized class V cavities were prepared on 60 extracted human teeth using a dental drill. 10 samples served as controls: class V preparation were conventionally drilled using a high speed hand piece. In 50 teeth, after conventional class V preparation, the drilled surfaces were subsequently modified using the CO_2 laser. These samples were subdivided into 5 groups of 10 teeth each and irradiated at one of the following parameters; 10mJ 5Hz, or 10mJ 10Hz, or 10mJ 25Hz, or 15mJ 10Hz, or 25mJ 5Hz. Prepared slabs of dentine and enamel were also irradiated at these parameters. All 60 tooth samples were then restored with KETAC Glass Ionomer Cement (Voco, Cuxhaven, Germany). The restored specimens were suspended in 5% methylene blue for 24 hours and then hemi-sectioned longitudinally through the filling. Microleakage measurements were made according to a standardized numerical system, (0) having no dye penetration to (5) having full dye penetration. Reduced microleakage was observed after modification at 10mJ 25Hz and at 25mJ 5Hz. SEM analysis of irradiated dentine and enamel slabs showed a strong parameter dependence of the laser effects. As thermal effects occurred at all parameters, we recommend use of a coolant system in further investigations.

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EFFECTS OF CO_2 CONTINUOUS AND SUPERPULSED LASERS ON DECIDUOUS TEETH ENAMEL.

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The effect of a new CO_2 superpulsed device (Sharplan 40C, Tel Aviv, Israel) on the enamel surface of deciduous teeth were compared to the effects provoked by the same device on the continuous mode. Literature presents works on superpulsed CO_2 laser specially on bone tissue and only two studies on permanent teeth. Deciduous exfoliated canine teeth were fractured in the mesio-distal direction with the help of a morse. 8 fragments were selected, from which 4 were exposed to continuous focused irradiation of CO_2 laser with a 2 watts potency during 1 second, resulting in a 2 joules energy application. The other 4 fragments were submitted to the same potency, during the same time in 90 microsseconds pulses. None of the groups was refrigerated. Specimens were dehydrated, coated with gold and examined on the scanning electronic microscope JEOL 6100. Results showed the specific effects of each group with the continuous utilization revealing the most pronounced effects of fusion and recristalization with presence of most pronounced concentric waves, cracks, enamel droplets formation, craters and even material loss and with less frequent surface roughness formation. The superpulsed group presented smoother characteristics of fusion and recristalization effects with softer enamel concentric waves and the presence of gaps, craters and enamel droplets. Besides, we observed other regions that terribly resembled the Er:YAG laser effect with the presence of flakes and scales, material loss with rugosity formation and enamel prisms uprising in several directions. We concluded that the effects of CO_2 laser irradiation on the continuous and superpulsed modes showed sharply distinct aspects that must be submitted to more detailed analysis in a future application on cavities preparation.

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MORPHOLOGICAL EFFECTS CAUSED BY IRRADIATION OF ER:YAG LASER ON DECIDUOUS TEETH ENAMEL. A SEM STUDY.

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Er:YAG laser effects on the enamel of deciduous teeth were evaluated using scanning electron microscopy. Deciduous exfoliated canine teeth were stored in 70% alcohol solution and later fractured in the mesio-distal direction with the help of a morse. Four sections were chosen and submitted in the medium third area to the application of 14 to 20 focused pulses of Er:YAG laser - KaVo KEY Laser 2 (Kavo Co., Germany), refrigerated with water spray, in the frequency of 4 Hz and 140 mJ per pulse, with a total energy of 1,96 to 2,8 J. The samples were dehydrated, mounted on metal stubs, coated with gold and examined in the scanning electron microscope JEOL 6100 (JEOL, Japan). The amount of pulses showed a crater on the enamel surface and numerous particles formed by microexplosion and serial vaporization. The surface revealed roughness, being characterized by the presence of flakes and scales along the walls. There were cracks along the area of laser application and enamel prisms in several directions. Also partial vaporization of the prisms and exhibition of the interprismatic substance were clearly noted. Areas of fusion and recristalization, and the characteristic carbonization, as observed with the application of CO_2 laser were not evidenced. We concluded that the application of Er:YAG laser on the enamel of deciduous canines followed the same pattern observed in the permanent teeth.

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AUTOFLUORESCENCE CHARACTERISTICS OF NORMAL AND NEOPLASTIC ORAL MUCOSA

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Secondary prevention is a possible way to improve the prognosis of patients suffering from oral cancer. In this study we assessed the benefits from autofluorescence photodetection of oral neoplasms.
A total of 49 patients bearing a squamous cell carcinoma of the oral cavity were investigated. Excitation of green tissue autofluorescence of innocuous and malignant tissue was performed at 375 to 440 nm using a xenon arc lamp. Images were recorded by a sensitive CCD camera. The fluorescence contrast between neoplastic and surrounding tissue was quantified using an optical multichannel analyzer.
In 43.3%, tumors were subjectively more clearly demarcated from normal tissue by a decrease in green tissue autofluorescence than under normal white light examination. Spectral analysis showed a measurable contrast of fluorescence intensities between normal and malignant mucosa in 94.4% of the patients with a mean factor of nearly 3.5 at 520 nm. Autofluorescence spectra of normal mucosa varied both inter- and intraindividually and are graphically displayed. In almost half of the cases examined, autofluorescence photodetection in the green spectral range presented a highly sensitive tool in the diagnosis of oral malignomas. To ameliorate the results, we propose a combination of autofluorescence photodetection and protoporphyrin IX fluorescence following topical application of 5-aminolevulinic acid by means of imaging techniques. Further investigations are required to assess the value of this procedure.

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ANTIBODY-TARGETED PHOTOLYSIS OF *PORPHYROMONAS GINGIVALIS* IN THE PRESENCE OF HUMAN GINGIVAL FIBROBLASTS.

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We have shown that *Porphyromonas gingivalis* (one of the main causative agents of periodontitis) can be killed using the light-activated antimicrobial agent, toluidine blue O (TBO) in combination with helium neon (HeNe) laser light. In order to develop a system which would enable the specific killing of *P. gingivalis* in the presence of human gingival fibroblasts (HGFs), TBO was linked to antibody raised against lipopolysaccharide (LPS), an immunodominant outer membrane component of *P. gingivalis*. HGFs were seeded in microtitre wells and when confluent, were washed with 0.85 % saline. *P. gingivalis* was added to triplicate wells. The suspensions were sensitised with 2.5 μg/ml TBO and exposed to either 0.88 or 6.6 J of light. *P. gingivalis* cells were removed and viability determined on fastidious anaerobe agar. The viability of HGF was determined by measuring ^{3}H-thymidine uptake. The procedure described above was also carried out using an Ab-TBO conjugate in place of the TBO. When TBO was used together with 0.88 J of light, the viability of both the *P. gingivalis* and HGF was unaffected. However, with 6.6 J of light, there was a 99.98 % and 50 % reduction in the viability of *P. gingivalis* and HGF, respectively. When the experiment was carried

out using 6.6 J of light in the presence of Ab-TBO instead of TBO the viability of the HGF was unaffected, but a 100 % kill was obtained with *P. gingivalis* cells. In conclusion, the results of this study have shown that specific killing of *P. gingivalis* in the presence of HGFs could be achieved by using TBO conjugated to an antibody against the bacterium.

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KINETICS OF PROTOPORPHYRIN IX SYNTHESIS AFTER TOPICAL APPLICATION OF AMINOLEVULINIC ACID IN THE ORAL CAVITY.

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This research investigation was aimed to determine the kinetics and selectivity of protoporphyrin IX (PpIX) synthesis in the oral premalignant lesions following topical application of δ-aminolevulinic acid (ALA). Healthy individuals as well as patients with premalignant lesions of the oral cavity were recruited. ALA in 20% solution buffered to pH 5.0 was administered via oral rinse each hour for 4 hours. Immediately after each administration, fluorescence emission spectra (450 to 800 nm) were recorded with a spectrophotometer (Spex FluoroMax) using an excitation wavelength of 410 nm. Fluorescence data from normal oral mucosa and premalignant lesions were analyzed and presented as relative fluorescence intensities. ALA conversion to PpIX in the premalignant lesions was assessed (i) in vivo by fluorescence photography using a digital camera (Nikon) equipped with UV flash (Norman) and a low pass filter in front of the camera lens; and (ii) ex vivo by standard fluorescence microscopy (Zeiss Axiophot). Uptake of ALA and conversion to PpIX showed different kinetics in premalignant oral lesions as compared to normal mucosa, such that uptake of ALA and conversion to PpIX was not only greater in lesions than normal oral mucosa, but also peak fluorescence intensities of PpIX occurred earlier. Patients who had heterogeneous lesions showed greater PpIX fluorescence in hyperkeratotic (white) areas than in atrophic (red) areas. We have demonstrated selectivity of uptake and synthesis of PpIX in premalignant lesions compared to normal oral mucosa.

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THE VALUE OF PHOTODYNAMIC THERAPY IN THE TREATMENT OF RECURRENT ESOPHAGEAL CANCER AFTER CHEMO-RADIATION THERAPY

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Purpose: We report our results using photodynamic therapy (PDT) for the treatment of recurrent esophageal cancer in patients previously treated with chemo-radiation therapy (CR).

Methods: The records of esophageal cancer patients referred for PDT were reviewed. Patients were then re-staged with upper endoscopy (EGD), chest CT, and endoscopic ultrasound (EUS). Patients were followed with EGD's every 3-4 weeks with visual estimate of PDT effect (< or > 50% tumor ablation). PDT used 2 mg/kg Photofrin (porfimer sodium) activated with 632 nm light: Laserscope KTP + PDT Dye Module using a 2.5cm cylindrical diffusing fiber to deliver 200-300 J/cm fiber length.

Results: Ten male patients with a mean age of 64 years (range 45-82 years) underwent PDT 10 months (mean; range 4-22) after previous CR. Tumors were adenocarcinoma (9) and squamous cell (1). Pre-PDT symptoms were dysphagia (8 patients), hemetemesis (1 patient) and hiccoughs (1 patient). EUS was successful in 7 patients and re-staged tumors as T_2N_0 (2 patients), T_3N_0 (3 patients), or T_3N_1 (1 patient) while 1 patient had adrenal metastatic disease. At a mean follow up of 5.4 months (range 2 - 13 months), 2 - T_2N_0 patients have no detectable tumor and all 3 - T_3N_0 patients have had a >50% tumor reduction. Five patients with metastatic disease (T_3N_1 or M_1) have all had effective dysphagia palliation.

Conclusions: (1) PDT is safe and effective in the palliation of patients with recurrent esophageal cancer after chemo-radiation therapy, and (2) Although follow up is limited, PDT may be able to ablate residual tumor in patients with mucosal disease after chemo-radiation therapy (T_1 or T_2N_0).

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PHOTODYNAMIC THERAPY OF SKIN TUMORS USING MTHPC®

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Non-melanomatous skin tumours are the most frequent tumours in the white population and mainly caused by cumulative exposure to solar ultraviolet B radiation. Standard treatment for most tumours is surgical resection, with often only a moderate cosmetic outcome.

In a prospective clinical trial the effect of photodynamic therapy on primary non-melanomatous skin tumours of the head and neck (squamous cell cancer, basal cell cancer, actinic keratosis, Bowen's disease) was tested. In this study meta-Tetrahydroxyphenylchlorin (mTHPC / Foscan®) was applied. Patients were injected 0.15 mg/kg or 0.10 mg/kg mTHPC 96 hours prior to laser light exposure. Light treatment was conducted using an argon-dye laser at 652nm, 100mW/cm2 and 5 - 20J/cm2 and superficial microlens applicator.

Eleven patients with a total of 73 non-melanomatous skin tumours and a mean follow up of 13 months (ranging 6 to 19 months) were treated. Within several days tumour necrosis appeared followed by wound healing within 4 to 8 weeks, leaving only minor scars behind. Seventy tumours showed a complete response with an excellent cosmetic outcome and only three basal cell cancers responded with partial success. No adverse events occured. The therapy was supported by a high degree of patient satisfaction.

By choosing the correct drug and light dosage, a selective tumour necrosis can be obtained. PDT using mTHPC seems to be a promising new and safe treatment modality for the treatment of primary non-melanomatous skin tumours of the head and neck which can substitute surgical therapy, offering an even better cosmetic outcome.

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Photosensitizer Accumulation in Drug Resistant Cell Lines upon Treatment with a Rose Bengal Fluorogenic Substrate.

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The acquired resistance is a frequent phenomenon for which tumor cells can develop cross-resistance to different anticancer drugs. It can be cause of failure in photodynamic therapy through a reduction of the photosensitizer cell accumulation. In this work, the possibility to overcome this PDT drawback was investigated by using a photosensitizer derivative (Rose bengal acetate) acting as a fluorogenic substrate. The fluorogenic substrate gives rise to the photosensitizer production directly inside the cell, favoring the photosensitizer cell accumulation through a mechanism based on both cell enzyme activity and metabolic energy supply. The cell accumulation process of Rose bengal (RB) was studied, in comparison to that of Photofrin II (PII), in tumor-derived cell lines expressing different kinds of acquired resistance to doxorubicin and cis-platinum (B16/DX, POGB/DX, A2780/DX/Pt, IGROV/Pt), and in the wild-type parent cell lines. For PII and RB, the amount of photosensitizer accumulated by resistant cells with respect to sensitive ones was found to be dependent on the resistance mechanism. Cells with resistance based on DNA damage repair mechanism (A2780/Pt, IGROV/Pt) accumulate RB and PII to the same extent in both sensitive and resistant lines. Cells with resistance based on membrane transport mechanism (B16/DX, POGB/DX) accumulate PII to a less extent in resistant with respect to sensitive cells. On the contrary, an overcoming of the resistance effect was observed for RB. It can be explained according to the equilibrium among fluorogenic substrate influx, photosensitizer intracellular production and photosensitizer efflux processes.

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LOW POWER VISIBLE LIGHT AND HYDROGEN PEROXIDE CHANGES INTRACELLULAR CALCUIM CONCENTRATION IN FIBROBLASTS CELLS

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We want to prove that after irradiating the cells with low intensity light the cell produces reactive oxygen species (ROS) which is responsible for the intracellular calcium $[Ca^{2+}]i$ oscillations that followed irradiation (as was noticed in previous studies). The search for ROS production in response to irradiation was done using spin trap electron paramagnetic resonance (EPR) spectroscopy and changes in $[Ca^{2+}]i$ was measured by using fluorescence imaging technique. By using the singlet oxygen ($^1O_2$) trap 2,2,6,6-tetramethyl-4-piperidone (TEMP) we found that illuminating a suspension of fibroblast (NIH) cells with visible light, causes the appearance of the adduct spectrum (TEMPO) signal. By using the fluorescence probe Indo-1 we found that (a) irradiation of NIH cells with 6 J/cm^2 visible light causes a long term oscillations of $[Ca^{2+}]i$. (b) by adding one of the ROS, hydrogen peroxide (H_2O_2), into the cell medium oscillations of $[Ca^{2+}]i$ also appear. Therefore we claim that low intensity of light causes production of small amounts of ROS, these cause the $[Ca^{2+}]i$ oscillations. We think that the long-term $[Ca^{2+}]i$ oscillations has an important role in the biostimulation effects such as, enhanced proliferation of fibroblast cells and induced capacitation of sperm cells.

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Fatty Acid Free Human Serum Albumin Decreases Expression of P-Selectin on Circulating Platelets.

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Human serum albumin (HSA) may be used as a solder in laser welding of blood vessels. Thrombogenic potential of this solder after it comes into direct contact with circulating platelets is not known. The purpose of this study was to evaluate the effect of albumin on platelet activation. Methods: 50% HSA was applied as a solder during laser welding of canine carotid arteries. Suture repair of carotid arteries was used as a control. Subsequently, blood samples from the treated area were obtained, and platelet activation was studied using monoclonal antibodies, anti-P selectin-FITC and anti-GP IIb/IIIa-PE and flow cytometry. The same assay was repeated in vitro, after incubation of blood samples with 50% HSA. Results: The percentage of activated (P-selectin positive) platelets tended to be lower in blood samples from HSA-laser than from suture ligated carotid arteries. Moreover, expression of the activation antigen, P-selectin was completely blocked ($p<0.01$) on circulating platelets after their in vitro incubation with 50% HSA. Conclusions: Fatty acid free human serum albumin blocks the expression of P-selectin on circulating platelets suggesting that HSA is an efficient platelet activation inhibiting biomaterial. Various pure HSA and combined solders containing HSA and other biomaterials are under current research in our laboratory.

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INTRATUMOR CISPLATIN INJECTION AND INTERSTITIAL LASER TREATMENT: A COMBINED THERAPY FOR SQUAMOUS CELL CARCINOMA

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Systemic administration of the chemotherapeutic agent cis-diammine dichlorplatinum (cisplatin) as an adjunct in the treatment of advanced head and neck cancer has been limited by side effects including nephrotoxicity. Interstitial laser therapy (ILT) is useful for tumor palliation, but recurrence is observed frequently at the margins. Combined intratumor drug and laser treatment may improve this outcome. To achieve high intratumor cisplatin levels and improved treatment response without systemic side effects, direct intralesional drug injection was followed by interstitial laser therapy. UCLA-P3 human squamous cell carcinoma tumors were grown as subcutaneous transplants in nude mice and treated by single intratumor injection of cisplatin in a slow release collagen-based gel carrier with epinephrine (epi-gel) four hours prior to interstitial implantation of Nd:YAG laser fiberoptics to induce local tumor hyperthermia. Tumor volumes were measured for 12 weeks after therapy. Interstitial laser therapy alone induced delayed growth compared to untreated control tumors, but a significantly greater number of complete responses were seen after combined cisplatin/epi-gel and laser therapy (75% combined versus 36% in the laser only group). The results of this experimental combined drug and ILT study suggest that it may be possible to improve treatment of advanced head and neck cancer by intratumor injection of cisplatin/epi-gel implants followed by interstitial Nd:YAG laser hyperthermia.

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EVALUATION OF LASER ONYCHECTOMY IN THE CAT

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Objective - To compare complication rates, plasma cortisol concentrations, urine cortisol:creatinine ratios and behavioral evidence of stress in cats declawed with the CO_2 laser and cats declawed using a conventional blade technique. **Design** - Double blind analysis. **Animals** - 40 random source cats. **Procedure** - Four groups of ten cats were evaluated for pain and discomfort after undergoing elective onychectomy or sham procedures. Ten cats (control) received no anesthesia, surgery or bandaging. Ten cats (bandage control) were anesthetized, had a tourniquet placed and were bandaged, but had no surgery performed. Ten cats (laser declaw) were anesthetized and had a CO_2 laser declaw performed with the use of a tourniquet. Ten cats (blade declaw) were anesthetized and had a conventional blade declaw performed with the use of a tourniquet and were bandaged afterwards. Data measured included 1) complication rates such as bleeding , limping, infection, swelling, and nonhealed incisions, 2) behavioral changes such as decreased play activity and changed feeding patterns, 3) serial blood cortisol levels before, 1, 3, 6, 24, and 48 hours after surgery, and 4) urine cortisol:creatinine ratios collected 24 hours before and 24 hours after the surgery.
Results - Complication rates for the laser declaw group were generally higher the first two days post-surgery as compared to the blade declaw group but were equivalent there after. Negative behavioral changes were more pronounced in the blade declaw group for two days post-surgery, with less play activity and willingness to use the paws noted. The percent increase in postsurgical blood and urine cortisol levels was higher in the blade declaw group than the other three groups for 24 hours following the surgery.
Clinical Implications - The use of the CO_2 laser to perform routine elective onychectomies may lower the postoperative pain and stress in cats, but it may, however, slightly increase the postsurgical complications in the first few days following the declawing procedure.

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FLUORESCENCE STAINING OF LARYNGEAL CANCER FOLLOWING TOPICAL APPLICATION OF 5-AMINO-LEVULINIC ACID: PRELIMINARY RESULTS

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The prognosis of patients suffering from laryngeal carcinomas could be improved by early diagnosis. Exact demarcation of tumor margins could help for an optimum preservation of the larynx. The aim of our study was to evaluate 5-aminolevulinic acid(5-ALA)-induced protoporphyrin IX(PPIX)-fluorescence staining as a tool for the detection of laryngeal cancer.

Inhalation of 5-ALA was performed with two different inhalation techniques by 16 patients with laryngeal cancer. After incubation the patients underwent microlaryngoscopy under whitelight and fluorescence illumination (λ_{ex}=375-440nm). Tumorous tissue showed red fluorescence which could be attributed to the 5-ALA-induced formation of PPIX. The surrounding normal tissue exhibited autofluorescence in the green spectral region. A quantitative analysis of the fluorescence contrast between neoplastic and surrounding tissue was performed using an optical multichannel analyzer. The results of fluorescence staining were significantly influenced by the method of inhalation.

According to preliminary results the presented method seems to be a promising diagnostic procedure for malignant neoplasms of the larynx. Aim of further investigations are the assessment of sensitivity and specifity as well as an evaluation of fluorescence-guided laser resections of laryngeal cancer.

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COMPARISON OF SINGLE LASER IN SITU KERATOMILEUSIS (LASIK) TREATMENT AND MULTIPLE LASIK TREATMENT

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Purpose: To determine factors which tend to require secondary treatment after the primary LASIK treatment.

Methods: Data was retrospectively examined on 959 eyes treated at a LCA-Vision laser center, 66 of which received secondary treatment of LASIK. The primary treatment included creation of a corneal flap with an automated mikrokeratome followed by laser ablation. The secondary treatment was performed within 6 months after the first treatment without the use of the microkeratome.

Results: In 959 primary LASIK, 1.8% of age group from 20 to 29 years of age required enhancement. The percentage increased with age and 16.5% of the age group from 50 to 59 years needed secondary treatment. 2.4% of preoperative spherical equivalent (SE) group from 0 to -3 D required secondary treatment and the ratio increased with preoperative SE, 12.0% of over –9 D SE group required the secondary treatment. 3.4% of the no astigmatism group required secondary treatment and 18.2% of cylinders over 3 D group required secondary treatment.

Conclusions: The secondary treatment rate was significantly high in old age, high myopia and high astigmatism group. We need to continually evaluate the nomogram used to treat patients.

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LASER IN SITU KERATOMILEUSIS FOR MYOPIA AND ASTIGMATISM AFTER RADIAL KERATOTOMY

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Purpose: To determine the results of laser in situ keratomileusis (LASIK) for myopia with or without astigmatism after radial keratotomy (RK).

Methods: Data was retrospectively collected on 16 eyes from 9 patients treated at a LCA-Vision laser center. They had RK done at least 1 year prior to LASIK. The refraction before LASIK was spherical equivalent (SE) from –0.125 to –5.5 diopters (D) (mean –2.38 D ± 1.62 [SD]) and cylinder from 0 to 2.75 D (mean 1.16 D ± 1.09). Surgery included creation of a corneal flap using an automated microkeratome with a 160 or 180 μm plate followed by laser ablation on the stromal bed. The diameter of laser ablation was 6 mm.

Results: No intra-operative complication was observed. Uncorrected visual acuity was 20/40 or better in 14 eyes (87.5%) at 1 day and 16 eyes (100.0%) at 1 month. At 1 month, the mean SE was 0.15 ± 0.64 D; 93.8% were within ± 1.00 D of plano. Two eyes gained two lines of best-corrected visual acuity and no eye lost more than two lines. At 1 day, of the 16 eyes observed in this study, one eye had corneal edema and another eye had interface keratitis.

Conclusions: In undercorrected eyes after RK, LASIK provides rapid visual recovery with satisfactory visual and refractive outcomes. Long-term stability awaits further study.